DOCUMENT RESUME

ED 093 836 95 SP 008 204

AUTHOR Sefein, Naim A.
TITLE The Relationship Between Attitudes and Training in Research. Final Report.
INSTITUTION State Univ. of New York, Fredonia. Coll. at Fredonia.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
BUREAU NO BR-I-B-100
PUB DATE 28 Feb 74
NOTE 132p.

EDRS PRICE MF-$0.75 HC-$6.60 PLUS POSTAGE
DESCRIPTORS *Attitudes; *Attitude Tests; College Faculty; College Students; *Educational Research; *Research; *Semantic Differential

ABSTRACT

This study attempted to relate the development of attitudes toward educational research with two variables in training: institutional setting and courses usually related to research training. The study compared the attitudes toward research between a) university and college faculty members, b) full-time and part-time graduate students, c) undergraduates in education and undergraduates in psychology, and d) college and university undergraduate students. A Semantic Differential scale of 6 concepts and 16 scales was used for the study. No significant differences were found between the attitudes of college and university faculty members, but all other comparisons revealed attitudinal differences. The results of the study suggest that: a) college and part-time graduate students as compared with university and full-time graduate students are less tolerant of theory and view quantitative procedures as having less value; and b) training in quantitative techniques positively affects the attitude of trainees. The instruments used in developing the Semantic Differential scale, as well as the data analysis tables, are included as appendixes A and B. (HMD)

ED 093836

FINAL REPORT

National Institute of Education

Project # I-B-100

THE RELATIONSHIP BETWEEN ATTITUDES

AND

TRAINING IN RESEARCH

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Principal Investigator: NAIM A. SEFEIN
State University College
Fredonia, New York

The research reported herein was performed pursuant to a grant with the National Institute of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated, do not, therefore, necessarily represent official National Institute of Education position or policy.

SP008 204

February 28, 1974

ABSTRACT

THE RELATIONSHIP BETWEEN ATTITUDES AND TRAINING IN RESEARCH

In an attempt to relate the development of attitudes toward research to instructors' attitudes and to course preparation, the study compared the attitudes of: samples of faculty members from small colleges and from universities; full-time and part-time graduate students in education; and undergraduate majors in teacher education and in psychology, studying at small colleges and at universities.

A Semantic Differential scale of six concepts and sixteen scales was used in the study. Factor analysis of scores showed a relative independence between dimensions of meaning and groups of respondents. However, there was a good deal of interaction among the scales and the concepts. Factor analysis of concepts x scale scores produced thirteen relatively independent clusters representing the dimensions of attitudes toward educational research.

Multivariate analysis showed no major differences between the attitudes of faculty members in colleges and in universities. Differences were found, however, between part-time and full-time graduate students in education, between education and psychology undergraduates, and between undergraduate students in colleges and universities.

The observed differences raised a few questions about the preparation of teachers and their participation in research. In addition, several questions related to Semantic Differential technique as a measurement tool were raised.

Acknowledgment

A project of this magnitude could not have been accomplished without the help of the many colleagues. To all those who have assisted in collecting data and to all respondents, I hereby express my great appreciation. Some, however, have contributed more than others and deserve a special mention.

In data collection, I am indebted to many colleagues. Drs. David Kapel at Temple University; James Larkin at the University of Pennsylvania; Harold Mitzel at Pennsylvania State University; Jimmy Fortune at University of Massachusetts at Amherst (now at Virginia Polytechnic Institute at Blacksburg, Virginia); David Krathwohl at Syracuse University; George Roberts at Edinboro State College, Edinboro, Pa.; Arnold Zaeske at Clarion State College, Clarion, Pa.; James Preus at the University of Minnesota; Allan Riedesel at SUNY at Buffalo; Ralph Antonen at Millersville State College, Millersville, Pa.; Thomas Schuell at SUNY at Buffalo; Richard Ripple at Cornell; Jack Bardon at Rutgers; Jerry Cataldo at State University College at Buffalo, all have been in one way or another helpful.

In preparing the optical scanning form and in the prelininary preparation of data for the computer, I am indebted to Dr. Daniel Bauman of the Teacher Education Research Center at Fredonia who endured the many hours of frustration at the Computer Center, especially during the change of equipment.

In completing the statistical analysis, I owe special gratitude to Dr. David Farr at State University of New York at Buffalo. David treated the problem of analysis with the interest and the enthusiasm that only a true scholar can provide.

Finally, I appreciate the understanding Dr. Pruitt, the Project Officer at the National Institute of Education, showed toward the problems that were involved in completing this report, and his willingness to extend the deadline for its submission.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENT	ii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF APPENDICIES	viii
I. THE PROBLEM	1
II. DESIGN AND PROCEDURES	
A. The Instrument	5
1. Background	5
2. Scale Selection	7
3. The Concepts	11
4. Controlling Response Pattern	11
5. Tryout and Validation	11
a. The respondents	12
b. Factor analysis of scales within respondents	15
c. Factor analysis of scales within concepts	18
d. Factor analysis of scale x concept scores	18
6. Summary of Isolated Attitude Variables	24
7. Reliability and Independence of Attitude Variables	26

Page

B. Comparisons Among Respondents

1. College vs University Faculty Members 29

2. Part-Time vs Full-Time Graduate Students 32

3. Education vs Psychology Undergraduates in Colleges and Universities 36

III. SUMMARY, CONCLUSIONS AND PROBLEMS

A. Summary and Conclusions 43

B. Limitations and Problems 45

1. The Design 46

2. The Measuring Instrument 47

REFERENCES 48

APPENDICIES 50

LIST OF TABLES

Table		Page
1	NUMBER OF USABLE RESPONSES BY CATEGORY OF RESPONDENTS	13
2	MEAN, STANDARD DEVIATION AND RELIABILITY ESTIMATES FOR THE 13 CONCEPT - SCALE FACTORS	27
3	INTERCORRELATION AMONG CONCEPT-SCALE FACTORS	28
4	UNIVERSITY VS. COLLEGE EDUCATORS: MEANS, STANDARD DEVIATIONS, AND DIFFERENCE BETWEEN MEANS IN STANDARD DEVIATION UNITS	30
5	COMPARISONS AMONG UNIVERSITY AND COLLEGE FACULTY A. MULTIVARIATE TEST B. UNIVERIATE TESTS	31
6	FULL-TIME VS. PART-TIME GRADUATE STUDENTS: MEANS, STANDARD DEVIATIONS, AND DIFFERENCES BETWEEN MEANS IN STANDARD DEVIATION UNITS	34
7	COMPARISONS AMONG FULL AND PART-TIME GRADUATE STUDENTS A. MULTIVARIATE TEST B. UNIVARIATE TESTS	
8	UNDERGRADUATES: MEANS AND DIFFERENCES BETWEEN MEANS IN STANDARD DEVIATION UNITS DIFFERENTIATED BY MAJOR AND BY INSTITUTIONAL SETTING	37
9	MULTIVARIATE COMPARISONS AMONG UNDERGRADUATES	38
10	COMPARISONS BETWEEN EDUCATION AND PSYCHOLOGY UNDERGRADUATES PARTIALING OUT EFFECT OF INSTITUTIONAL SETTING	39
11	COMPARISONS AMONG UNIVERSITY AND COLLEGE UNDERGRADUATES PARTIALING OUT EFFECT OF MAJOR	30

LIST OF FIGURES

Figure		Page
1	Scale factors based on analysis of scores for groups of respondents.	1o
2	Distribution of scales among the five factors isolated in within-group analyses.	17
3	Distribution of scales among the four factors isolated in the within-concept analyses.	19
4	Concepts x scales defining the factor S_7 (Technical-Science Potency)	23
5	Concept X scales defining the factor S_8 (Experimental Science Potency)	23
6	Distribution of the 96 variables (6 concepts x 16 scales) among the 13 factors	25

LIST OF APPENDICIES

APPENDIX A — Page

INSTRUMENTS USED IN DEVELOPING THE SEMANTIC DIFFERENTIAL SCALES

1. Free Response Forms 52
2. Multiple Choice Form 56
3. A Sample of the Final Instrument 62

APPENDIX B

DATA ANALYSIS TABLES

1. Tables of principal component factors rotated according to normalized varimax criterion; within groups analyses. 73
2. Tables of principle component factors rotated according to the normalized varimax criterion; within concepts analyses. 80
3. Tables of rotated factors for scales concepts analyses. 93

THE RELATIONSHIP BETWEEN ATTITUDES AND TRAINING IN RESEARCH

I - THE PROBLEM

The question which this study attempted to investigate is, how do educators develop an attitude favorable to research? Do they acquire it as a product of the course work traditionally associated with research training? Do they acquire it as a by-product of association with faculty members who are knowledgeable and supportive of research?

The concern with attitudes toward research stems from the concern with finding solutions to the numerous problems facing education today. Problems, such as those related to minority groups, the underachiever, drug addiction, school dropouts, and student unrest have highlighted the need for a more serious look at the curriculum and the process of instruction. The urgent need for unconventional solutions to these problems has prompted a huge investment in innovative programs. But, while developing novel situations is desirable, the fact remains that without rigorous evaluative research it is almost impossible to sort out the procedures which are genuinely productive from those that are merely novel and attractive. In brief, the need is more than ever for more research.

Training more basic researchers, however, is an insufficient condition for present research demand. The problems of today are real life problems and cannot be solved by basic research alone. They call for field research which in turn requires that educators at all levels, including the practitioners in the field, participate in the development and the testing of solutions (Keppel, 1964). This means, among other things, the creation of a more favorable image

about research among school personnel. But, now this can be done, is still unclear.

In an attempt to find out how educators acquire the attitudes favorable to research productivity, Buswell and McConnell (1966) tried to relate productivity with variables in training. Contrary to expectations, they found no differences in the course preparation of those who publish and those who do not. They found, however, that educators who continue to publish tend to be among those who had a major part of their graduate training while residing on a campus active in research (Buswell), et. al., 1966). Significant as they may be, these findings are hard to interpret. Krathwohl (1955) felt that, through association with researchers, students acquire skills and attitudes not communicated in the courses normally associated with research training such as statistics, measurement, and research methods. But, even if that is true, a question still remains. Why do some students seek to reside on campus for full-time training while others take most of their training while holding full-time teaching jobs? Do they feel that research training is important and hence seek maximum experience through full-time involvement, or do they acquire the attitude toward research productivity as a by-product of full-time involvement?

Obviously, the question of attitude development is complex and may not be subject to direct examination. At least, three interrelated factors seem to be involved: (a) the institutional setting, as defined by the degree to which its faculty do engage in research; (b) the curriculum, as defined by its inclusion of courses directly associated with research training such as measurement, statistics, and research techniques; (c) the learner, as defined by his personal characteristics and professional outlook.

The institutional setting may be categorized into (a) large universities, especially those who offer doctorate degrees in education - where faculty members are usually expected to engage in research; and (b) small colleges where graduate offerings are usually limited to the masters level and where faculty members are usually not pressured to engage in research.

Given a fixed curriculum, faculty members who are research oriented are likely to discuss theories and review research studies more so than those faculty members who are less versed in research.

In education, the second variable, namely curricular expectations, as defined by the degree to which the program requires students to study courses in measurement, statistics and research methods, are more pronounced at the graduate level than at the undergraduate level. Full-time graduate students tend to enroll in universities, have graduate assistantships and enroll early in research preparatory courses. Part-time students, on the other hand, tend to take a broad variety of courses basically for permanent certification. They also tend to avoid research preparatory courses which are usually more demanding and have to be taken in a sequential order.

The learner, as a third variable, is even more complex than the preceding two. University students on the average tend to be higher in ability and achievement than college students. Personality-wise, they also tend to be more tolerant to ambiguity. College students tend to be more concerned with practical matters. They favor an environment that is less threatening and prefer small classes where there is a chance for more student-faculty interaction.

The interdependence of the variables is another complicating factor. For example, college teachers who have research experiences may find that they have to modify their curricular expectations as a result of student pressure. This is especially true where student ratings are used in instructor evaluation. When research is not encouraged and when student satisfaction is the major criterion for teacher evaluation, college teachers have no option but to modify their curricular expectations.

Recognizing the complexity of variables involved in attitude development, this study attempted to limit itself to the study of research attitudes as they relate to institutional setting, and curricular expectations at the undergraduate and graduate level. At the undergraduate level of preparation, it also tried to contrast the situation in education with another area in the behavioral sciences, namely, psychology. Unlike education, psychology students, regardless of the training institutions, are expected to study statistics, theories, and experimental psychology. If that curricular content was influential in developing attitudes toward research, then psychology students in colleges should not differ from their counterparts in universities.

Specifically, this study attempted to relate attitudes toward research with faculty orientation and curricular expectations by seeking answers to the following questions:

a. Do college faculty differ from university faculty in their attitudes toward research?

b. Do part-time graduate students in education differ from full-time graduate students in attitudes toward research?

c. Do psychology seniors differ from education seniors in attitudes toward research?

d. Do college seniors in education and psychology differ in attitudes toward research from those on university campuses?

II. DESIGN AND PROCEDURES

A. The Instrument

1. Background

A promising first step toward constructing a scale for measuring attitudes toward research was reported by Sefein (1969, 1970). Using a Semantic Differential scale, he isolated four factors representing the dimensions of meaning which educators associate with research. The factors were named:

a. an intellectual openness factor which is represented in the scales: original-stereotyped; creative-restrictive, etc.

b. a potency factor which is represented in the scales: conclusive-inconclusive; decisive-confusing, etc.

c. an intellectual demand factor represented in the scales: complex-simple; easy-difficult, etc.

d. a utility or usefulness factor represented in the scales: significant-unimportant; practical-useless.

In addition to identifying the dimensions of attitudes toward research, the scale seemed to be reasonably sensitive to detect differences among subject groups. In comparing the attitudes of educators who expressed interest in participating in a Consortium on Research Development (CORD) program with the attitudes of those who did not express interest, several significant differences were detected. For example, in contrast with non-participants, those who expressed interest in participation in (CORD) viewed testing, evaluation, experimentation and survey as high on the potency factor; and evaluation as high on the utility or usefulness factor. They also saw curriculum as less potent and conclusive than did the non-participants.

The fact that the instrument was able to detect the above differences in attitudes was considered encouraging for at least two reasons. The first is that the two groups of educators came from essentially a homogeneous population, namely the same faculty of small colleges where research was not emphasized. The second is that the criterion for sorting the groups of educators was a weak one, namely the mere expression of interest in the CORD program. A stronger criterion such as actual participation in research would have probably resulted in identifying more differences.

Encouraged by such results, it was decided that the present instrument would build on the previous one. This involved refining the scales to insure that the basic assumptions made in Semantic Differential measurement are met.

By the way of a background on the process of refinement, it may be mentioned that the Semantic Differential technique as developed by Osgood et al (1957) requires the subjects to rate a set of concepts on a set of scales. The concepts represent the objects toward which the subjects indicate their connotative meanings when they mark the scales. The scales represent the continua of meaning; each continuum is defined by two antonyms anchoring its extreme points.

Typically, a large number of scales is used. The scales are usually selected to provide replicated measures of the anticipated dimensions of meaning. This is crucial, for a small number of scales per measure means a lower reliability for that measure. Since the verification of components of meaning is done through factor analysis, starting with a large number of scales, one expects that each of the factors representing the dimension of meaning is measured by several scales.

The scaling process in the Semantic Differential technique is also based on psychometric assumptions regarding the linearity of the scales, the bipolarity of adjectives anchoring the extreme points of the scales, and regarding the relevance of the scales to the concepts being evaluated. Heise (1969), however, after reviewing the research on the Semantic Differential, indicated that in many situations some of these assumptions are not warranted. He recommended testing, rather than assuming, that the scales do not violate the expected psychometric characteristics.

2. Scale Selection

Since the dimensions of attitudes were known, the refinement attempted in this study involved revising the original instrument to: (a) increase the homogeniety of the scales measuring each of the four dimensions of attitudes isolated in earlier research; (b) improve the metric properties of the scales; and (c) decrease the scale-concept interaction by increasing the relevancy of the scales to the concepts.

a. Homogeniety and independence of factor scales. As is often the case in studies of attitudes, the factors isolated in the previous study (Sefein, 1970) were intercorrelated. Some scales which had a high loading on one factor had also some appreciable loading on one or more other factors. In an attempt to reduce the degree of intercorrelation among the four factors, one or two adjective pairs which had the highest loading on one factor and low loading on the others were first isolated. Then, using Webster's New Dictionary of Synonyms (1968) and Roget's Thesaurus of Synonyms and Related Terms (1962), eight synonyms and related terms were

selected to represent replications of the scale(s) measuring each of the four factors. Starting with this initial pool of 32 adjectives it was hoped that further refinement would permit the selection of 10 scales to be used in the study.

b. Metric Properties of Scales. The Semantic Differential technique assumes first, that the scale intervals are equal. While this may not always be true, Messick (1957) has indicated that violations of that assumption are not serious. Thus, the equal interval assumption was retained.

Second, the Technique assumes that the scales are linear and that the adjectives representing the extreme points of the scale are functional antonyms. This assumption was questioned by Hardkoff (1963, 1965); who found that lindguistic contrasts did not always represent functional antonyms.

To insure that the adjective pairs used in the present study are functional antonyms, a procedure similar to that used by Carter, Ruggles and Chaffee (1968) was adopted. A group of 48 "judges" drawn from college seniors majoring in English and Social Studies were given the list of 32 adjectives and the list of concepts. They were asked to provide the antonym for each of the adjectives given. The selection of seniors majoring in English and Social Studies was based on the assumption that such seniors do possess a good facility with the language. Good agreement among the judges was anticipated and the criterion was initially set that only those antonyms agreed upon by 75% of the respondents would be used in constructing the Semantic Differential scales.

Tabulation of the actual responses given by these 48 "judges" (see Appendix A-1) brought a surprise. For each adjective the respondents supplied a long list of antonyms. There were also a large number of omissions. Appreciable agreement occurred only on a few of the common adjectives, although in no case did the agreement reach the criterion level.

With that diversity of responses, the free response form was considered not realistically suitable forthe job of defining the functional antonyms. Instead a multiple choice form was developed. In that form each of the original 32 adjectives was followed by four choices of antonyms. The form was then given to a new sample of 120 subjects who were asked to select the most appropriate antonym for the adjectives given in the items.

As can be seen in Appendix A-2, the restriction on the freedom of choice produced, as expected, more agreement among the respondents. But, only in the choice of six antonyms was that agreement high enough to meet the criterion level of 75%. Finally, the decision was made to abandon the criterion of 75% agreement as unrealistically high, and to use the adjective pairs on which there was a reasonable level of agreement.

c. Concept-Scale Interaction. Concept scale interaction in the sense that some scales are more appropriate for rating some concepts than others, is a problem in constructing Semantic Differential instruments. In reviewing the various sources of interaction, Heise (1969) traced three sources to artifacts in data analysis. Two conditions, however, were seen to represent a true source of interaction: concept-scale relevance, and the environment provided by the concepts. Heise (1969) recommended that

the scales be validated for the concepts by factoring the scales over the concepts. Carter, Ruggles, and Chaffee (1968) recommended that respondents be allowed to rate and to omit the scales which they felt were inappropriate for rating the concepts.

In the present study the two procedures recommended were used. The procedure recommended by Carter, Ruggles and Chaffee was modified and used as a preliminary screening of the relevant scale. This was done in the free response form by asking the judges to separately check the scales they considered relevant to each concept. But since there was no agreement on the antonyms, and since there was a wide discrepancy in judging the relevance of the scales, it became difficult to determine if absence of check marks was a case of nonresponse or that of judging the scales as not relevant.

In the multiple-choice form the judges were then given the concepts but they were asked to treat them as a homogeneous group, and to judge each of the scales as relevant or not relevant for the total group of concepts. Using this procedure 15 scales were rated relevant at the criterion of 75% or more level of agreement and many more scales approached that criterion.

The final selection of scales/factors did utilize most of the information obtained from the analysis of the antonyms above. However, the desirability of selecting four replications of the four dimensions of attitudes was given some priority over the absolute agreement among judges. In that sense, the four adjective pairs out of the initial list of eight per factor, which were rated as true antonyms and as relevant to the concepts, were retained as measures of that factor.

3. The Concepts

Eight concepts were initially selected as "representative of empirical research and were used in the ratings of concept - scale interaction. To conceal the purpose of measurement four unrelated concepts or distractors were added making a total of twelve to be rated by the respondents.

However, in a pilot test, the time required for completing the rating of 12 concepts on 16 scales was found to average 45 minutes. The subjects who completed the instrument felt that the task was monotonous. Keeping the instrument as is, it was feared, would reduce the seriousness of respondents and/or increase the percentage of non-respondents. Hence two research concepts were eliminated. The final instrument included then six research concepts (Educational Research, Experiment, Measurement, Science, Technical Report, and Theory); and four distractors (Curriculum, Instruction, Art and Intuition).

4. Controlling Response Pattern

In constructing the instrument the issue of response pattern was also considered. To discourage respondents from marking responses in patterns, seven scales selected at random were reversed. The 16 scales for each concept were also divided at random into four clusters, and the clusters were randomly ordered for printing on specially designed Optical Scanning response sheets (see Appendix A-3).

5. Tryout and Validation

The factorial structure of the instrument can vary as a result of the interaction of the scales with the respondents and/or the scales with the concepts (McGuire, 1973). Hence, the process of validation involved

administering the instruments to samples of respondents and then factor analyzing the scores within respondents, within concepts, and later the scores for scales x concepts. It should be mentioned here, that since the interest focused on attitudes toward research, only the scores related to the six research concepts were analyzed.

a. The Respondents

Ten samples of respondents completed the instrument. The samples were essentially conveniently selected, but were obtained from multiple institutions to allow some confidence in making generalizations. Most of the samples came from the east region of the United States.

The samples were selected from large universities and from small colleges. Responses were obtained from five categories of respondents: faculty members, full-time graduate students in education; part-time garduate students in education; undergraduates in teacher education who completed the professional education courses and undergraduate seniors in psychology or at least juniors who completed courses in statistics and experimental psychology. Table 1 shows the number of useable responses received by category of respondents.

The sample of university faculty was mainly obtained from four institutions (Syracuse University, Pennsylvania State University, the University of Pennsylvania, and Temple University). The sample of college faculty was mainly obtained from two colleges: Edinboro State College and State University College at Buffalo. All the education faculty in these institutions in the Spring of 1971 (save for counselors, physical education and some special or

TABLE 1

NUMBER OF USABLE RESPONSES BY CATEGORY OF RESPONDENTS

GROUP	N
1. University Faculty	101
2. College Faculty	45
3. University Undergraduate Education	56
4. College Undergraduate Education	193
5. University Undergraduate Psychology	95
6. College Undergraduate Psychology	150
7. Full-time Graduate Education	235
8. Part-time Graduate Education	169
TOTAL	1044

part-time instructors) were mailed the instrument. One follow-up letter was sent to those who did not respond by six weeks of the initial mailing.

Student samples were obtained from a wide range of institutions which included the State University of New York at Buffalo, Cornell University, the University of Massachusetts at Amherst, Rutgers, Temple University, the University of Minnesota, State University College at Buffalo, Edinboro State College, Clarion State College and Millersville State College. Typically, faculty members were contacted by telephone and requested to help administer the instrument to their students. They were given freedom in selecting the time and mode of administration. Some administered the instrument in class. Others distributed the instrument to their students to complete at home and later collected the responses. Still others distributed the instrument in stamped, addressed envelopes and requested the students to mail their responses directly to the researcher. Thus, no record of the response rate was possible. In a few cases, the instructors were not able to assist and returned the total package of instruments untouched.

It may be mentioned here, that optimistically the directions for the instrument requested more information on the respondents than used in the analysis. It was hoped that in the future it would be desirable to compare elementary and secondary education majors, or faculty and graduate student groups by area of

specialization. However, the sample of respondents in some sub-groups was too small to allow reliable comparisons.

b. Factor Analysis of Scales Within Groups of Respondents

To test for scale x respondent interaction, several factor analyses were performed on the scores obtained from various subject groups. The scores were summed over concepts and scales. Using the principle component method and rotating the normalized factor loadings orthogonally using varimax criterion, five factors were separated out of the responses of each of the following six groups: University, College, Faculty, Graduate Students, Undergraduate Students in education, and Undergraduate Students in psychology. The tables showing the rotated factor loadings obtained in these analyses are included in Appendix B-1. A summary of the distribution of the scales among the factors is given in Figure 1. As can be seen in Figure 1, a good degree of congruency existed among the respondents in the way they saw the scales clustered. Hence it was concluded that the respondent-scale interaction is not serious, and was ignored in further analyses.

It should be noted, however, that the way in which the scales clustered among the factors (see Figure 2) differed from what was hypothesized when the instrument was constructed.

SCALES	RESPONDENTS					
	University	College	Faculty	Grad.	Undergrad. Ed.	Undergrad. Psy.
1. Boring-Exciting	1	1	1	1	1	1
2. Imitative-Original	5	5	5	5	5	5
3. Unimaginative-Creative	1,5	1	1	1	1	1
4. Restricted-Free	3	5	5	5	5	5
5. Doubtful-Decisive	3	3	3	3	3	3
6. Questionable-Substantiated	2	2	2	2	2	2
7. Unconfirmed-Conclusive	3	3	3	3	3	3
8. Subjective-Objective	2	2	2	2	2	2
9. Shallow-Deep	1	1	1	1	1	1
10. Common-Exceptional	1	1	1	1	1	1
11. Simple-Complex	4	4	4	4	4	4
12. Easy-Difficult	4	4	4	4	4	4
13. Worthless-Valuable	1	1	1	1	1	1
14. Irrelevant-Significant	4	2	4	4	4	4
15. Harmful-Beneficial	1	1	1	1	1	1
16. Hindering-Helpful	4	2	4	4	4	4

Figure 1. Scale factors based on analysis of scores for groups of respondents.

Factor I

Boring - Exciting
Immitative - Creative
Shallow - Deep
Common - Exceptional
Worthless - Valuable
Harmful - Beneficial

Factor II

Questionable - Substantiated
Subjective - Objective

Factor III

Doubtful - Decisive
Unconfirmed - Conclusive

Factor IV

Simple - Complex
Easy - Difficult
Irrelevant - Significant
Hindering - Helpful

Factor V

Immitative - Original
Restricted - Free

Figure 2. Distribution of scales among the five factors isolated in within-group analyses.

c. Factory Analysis of Scales Within Concepts

To test for scale X concept interaction the scores were summed over all the respondents separately for each of the six research concepts and factor analyzed using the principle component method. The factor loadings were then normalized and rotated orthogonally according to the Varimax criterion. Tables of the six factor matricies are included in Appendix B-2. Figure 3 shows a summary of the way the scales clustered within the concepts.

As can be seen in Figure 3, the way the scales clustered varied from one concept to another, signifying a substantial amount of concept scale interaction. Thus the initial assumption that the concepts represent a "homogeneous" sample of those related to research appeared unwarranted, at least as far as the respondents are concerned. With this evidence in mind, the decision was made to move toward isolating the scale - concept clusters.

d. Factor Analysis of Scale Concept Scores

With evidence of concept X scale interaction the scores on the 96 variables (16 scales x 6 concepts) were computed. To make computations more manageable the matrix of scores was divided into four sets. The scales x concept components of each set was selected based on the way they tended to cluster in the previous analyses. The tables for this analysis are included in Appendix B-3. The following is a summary of the results:

SCALES	CONCEPTS					
	Educational Research	Experiment	Measurement	Science	Technical Report	Theory
1. Boring-Exciting	1	1	1	1	1	1
2. Imitative-Original	2	3	1	1	1	2
3. Unimaginative-Creative	1	3	1	1	1,2	1
4. Restricted-Free	3	2	1	2	1	2
5. Doubtful-Decisive	1	1	2,3	1	2	1
6. Questionable-Substantiated	3	3	3	2	2	1
7. Unconfirmed-Conclusive	3	3	3	1	4	4
8. Subjective-Objective	3	3		2	3	4
9. Shallow-Deep	2	3	2	1	2	1
10. Common-Exceptional	2	1	1	3	2	1
11. Simple-Complex	4	4	4	3,4	4	4
12. Easy-Difficult	4	4	4	4	4	4
13. Worthless-Valuable	1	3	2	3	2	1
14. Irrelevant-Significant	3	2	3		3	2
15. Harmful-Beneficial	1	1	2	3	3	1
16. Hindering-Helpful	2	2	3	2	2	2

Figure 3. Distribution of scales among the four factors isolated in the within-concept analyses.

(1) Looking at the analysis of scales within concepts, the scales 1, 3, 9, 10, 13 & 15 tended to cluster together in one factor cutting across most of the 6 research concepts. Thus a separate principle component analysis was completed on these 6 scales and the six concepts. Seven factors were initially identified. The first factor cut across all the scales and concepts and accounted for 17.2% of variance. This group factor was labeled G_1. It represented a general feeling that research is an engaging, productive, and creative effort. Hence the factor was labeled "General Affect" factor.

After excluding factor G_1, the remaining six factors were then rotated to a simple structure. Four specific factors became pronounced. The factors were labeled S_1, S_2, S_3, and S_4, and named:

S_1: Theory orientation: involved feeling about "theory" as exciting-creative-exceptional effort against that feeling of boring, unimaginative and common.

S_2: Educational research orientation: in the sense of seeing research as exciting and valuable as compared with a boring, useless endeavor.

S_3: Technical or empirical orientation: combining the concepts of measurement and technical reports with the feelings exciting, creative vs. boring, unimaginative.

S_4: Science-experiment orientation: combining experiment and science and theory with the connotation of exceptional and significant as compared with common endeavor and irrelevant.

(2) Next, scores for the scales 11, 12 (simple-complex and easy-difficult) which tended to show as a separate factor in all the within-groups and within-concepts analyses were factor analyzed. This analysis produced two factors which cut across some concepts and scales in a mixed pattern representative of overfactoring. Hence it was decided to accept the original one factor solution as more appropriate. Since this factor was related to all concepts it was labeled G_2 and named a complexity factor.

(3) Third, Scale 4 (restricted-free) presented another special case of having significant loading over the six concepts. To verify its independence of the other scales the scores related to this scale were combined with those of the scales 9, 11, 12 (shallow-deep, simple-complex, and easy-difficult) were analyzed and the normalized factor matrix was rotated according to the Varimax criterion. In this analysis scale 4 showed as a separate factor with significant loading on all the 6 concepts. Based on this, it was labeled G_3 and named as Freeness factor.

(4) The remaining 7 scale-concept scores were then subjected to a separate factor analysis and the normalized scores were rotated according to the Varimax criterion. From this analysis seven factors which were isolated were labeled:

G_4 Decisiveness factor which incorporated the scale Doubtful-Decisive and the concepts Educational Research, Experiment, Measurement, Technical Report, and Theory.

G_5 Usefulness factor which incorporates the scales Useless-Useful, Irrelevant-Significant and the concepts Experiment, Science, Technical Report, and Theory.

S_4 Experiment-Science orientation factor which incorporated the concepts Experiment, Science and the scales Common-Exceptional.

S_5 Educational Research Potency factor which incorporated mostly the concepts Educational Research and the scales Questionable-Substantiated, Unconfirmed-Conclusive, and Irrelevant-Significant.

S_6 Theory-Potency factor which incorporated the concept Theory and the scales Doubtful-Decisive, Questionable-Substantiated, Unconfirmed-Conclusive and Subjective-Objective; the scale Unconfirmed-Conclusive as related to Experiment; and the scale Immitative-Original as related to Measurement.

S_7 Technical -Potency factor which incorporated the scales Subjective-Objective and the concepts Educational Research, Measurement, Science, and Technical Report; the scale Questionable-Substantiated as it relates to Measurement, Science, Technical Report; the scale Unconfirmed-Conclusive as it relates to Measurement and Technical Report; the scale Hindering-Helpful as it relates to Measurement; and the scale Immitative-Original as it relates to Theory (see Figure 4).

S_8 Experiment-Science Potency factor - which involved the scale Immitative-Original as it relates to Educational Research, Experiment and Sciences; the scale Questionable-Substantiated as it relates to Experiment; the scale Unconfirmed-Conclusive as it relates to Science; the scale Subjective-Objective as it relates to Experiment; and the scale Hindering-Helpful as it relates to Educational Research. (see Figure 5).

SCALES	CONCEPTS						
	Ed.	Res.	Exp.	Meas.	Sci.	T.R.	Theory
1. Original							x
2. Decisive							
3. Substantiated				x	x	x	
4. Conclusive				x		x	
5. Objective		x		x	x	x	
6. Significant							
7. Helpful				x			

Figure 4. Concepts x scales defining the factor S_7 (Technical-Science Potency)

SCALES	CONCEPTS						
	Ed.	Res.	Exp.	Meas.	Sci.	T.R.	Theory
1. Original		x	x		x		
2. Decisive							
3. Substantiated			x				
4. Conclusive					x		
5. Objective			x				
6. Significant							
7. Helpful		x					

Figure 5. Concept x scales defining the factor S_8 (Experimental Science Potency)

6. Summary of Isolated Attitude Variables

In summary the factor analysis of concept x scales scores produced a total of 13 factors. Five cut across the concepts and were thus considered generalized factors. The remaining factors tended to combine some concepts with some scales and were thus considered specific factors. Figure 6 shows the distribution of the 96 concept-scale variables over the thirteen factors. Below is a summary of these factors and the psychological meaning they seem to represent. For the sake of clarity, only the positive end of the scales is used to communicate the connotative meaning.

G1 General Affect Factor: characterizing research as engaging, productive and creative endeavor.

G2 Complexity Factor: characterizing the research endeavor as complex and difficult.

G3 Freeness Factor: characterizing research as free.

G4 Decisiveness Factor: characterizing "empirical research" with aiding in making decisions or verifying hunches.

G5 Usefulness Factor: characterizing scientific research as valuable and useful.

S1 Theory Orientation Factor: characterizing theory as being creative and exciting.

S2 Educational Research Orientation Factor: characterizing educational research as enjoyable, challenging and valuable.

S3 Technical or Empirical Orientation Factor: characterizing technical and quantitative aspects of research with excitement, challenge and creativity.

Concepts

Scales	Ed. Res.		Exp.		Meas.		Science		T. R.		Theory	
	v	f	v	f	v	f	v	f	v	f	v	f
1 Boring-Exciting	1	G1, S2	17	G1	33	G1, S3	49	G1	65	G1, S3	81	G1, S1
2 Imitative-Original	2	S8	18	S8	34	S6	50	S8	66	G4	82	S7
3 Unimaginative-Creative	3	G1	19	G1	35	G1, S3	51	G1	67	G1, S3	83	G1, S1
4 Restricted-Free	4	G3	20	G3	36	G3	52	G3	68	G3	84	G3
5 Doubtful-Decisive	5	G4	21	G4	37	G4	53	G4	69	G4	85	S6
6 Questionable-Substantiated	6	S5	22	S8	38	S7	54	S7	70	S7	86	S6
7 Unconfirmed-Conclusive	7	S5	23	S6	39	S7	55	S8	71	S7	87	S6
8 Subjective-Objective	8	S7	24	S8	40	S7	56	S7	72	S7	88	S6
9 Shallow-Deep	9	G1	25	G1	41	G1	57	G1	73	G1	89	G1
10 Common-Exceptional	10	G1	26	G1, S4	42	G1	58	G1, S4	74	G1	90	G1, S1
11 Simple-Complex	11	G2	27	G2	43	G2	59	G2	75	G2	91	G2
12 Easy-Difficult	12	G2	28	G2	44	G2	60	G2	76	G2	92	G2
13 Worthless-Valuable	13	G1, S2	29	G1	45	G1	61	G1	77	G1	93	G1
14 Irrelevant-Significant	14	S5	30	G5	46	G5	62	G5	78	G5	94	G5
15 Harmful-Beneficial	15	G1	31	G1	47	G1	63	G1	79	G1	95	G1
16 Hindering-Helpful	16	S8	32	G5	48	S7	64	G5	80	G4	96	G5

Figure 6. Distribution of the 96 variables (6 concepts x 16 scales) among the 13 factors

S4 Experimental Science Orientation Factor: characterizing scientific experimentation as being exceptional.

S5 Educational Research Potency Factor: characterizing educational research as producing conclusive and significant results.

S6 Theory-Potency Factor: characterizing theory as substantiated, conclusive, objective and decisive.

S7 Technical-Potency Factor: characterizing measurement, science, and technical reports as objective and leading to substantiated conclusions.

S8 Experiment-Science Potency Factor: characterizing experiments, educational research and science as producing objective, substantiated conclusions.

7. Reliability and Independence of Attitude Variables

The reliability coefficients for the thirteen measures isolated by factor analysis are reported in Table 2. As expected, the measures with small number of items had lower reliability estimates than those with more items. Although some of the measures had relatively lower coefficients than it was hoped for and caution is due in interpreting them, the overall picture is not inconsistent with typical measures of attitudes.

To assess the degree of independence among the measures their intercorrelations were computed and are reported in Table 3. As expected G1 correlated relatively high with six of the measures. But most of the remaining intercorrelations were low, reflecting a good degree of independence among the factors.

TABLE: 2

MEAN, STANDARD DEVIATION AND RELIABILITY ESTIMATES

FOR THE 13 CONCEPT - SCALE FACTORS

	FACTOR	NUMBER OF ITEMS	MEANS*	STANDARD DEVIATION	ALPHA
1.	G-GENERAL	36	4.26	.81	.935
2.	G2-COMPLEXITY	12	5.38	.70	.770
3.	G3-FREENESS	6	4.13	1.09	.780
4.	G4-DECISIVENESS	6	4.04	.92	.696
5.	G5-USEFULNESS	8	5.61	.80	.774
6.	S1-THEORY ORIENTATION	3	4.47	1.11	.716
7.	S2-RESEARCH ORIENTATION	2	4.83	1.17	.619
8.	S3-TECHNICAL ORIENTATION	4	3.60	.91	.602
9.	S4-EXP-SCI ORIENTATION	2	4.38	1.06	.517
10.	S5-ED RESEARCH POTENCY	3	5.16	1.07	.593
11.	S6-THEORY POTENCY	6	4.46	.88	.645
12.	S7-TECHNICAL POTENCY	11	5.08	.75	.728
13.	S8-EXP-SCI POTENCY	7	4.10	.96	.770

* Means after reversing the proper scale; N = 1044 (total population)

TABLE 3

INTERCORRELATION AMONG CONCEPT-SCALE FACTORS

FACTOR	G_1	G_2	G_3	G_4	G_5	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
G1-		-.01	-.21	.74	.13	.62	.56	.42	.57	.01	.01	-.04	.51
G2-	-.01		.02	-.04	.47	-.06	.06	-.11	.06	.26	.15	.37	.15
G3-	-.21	.02		-.30	.27	-.03	-.0	.21	-.05	.29	.36	.34	-.16
G4-	.74	-.04	-.30		.03	.35	.41	.16	.43	.02	-.03	-.05	.39
G5-	.13	.47	.27	.03		.15	.15	.11	.10	.40	.30	.57	.23
S1-	.62	-.06	-.03	.35	.15		.29	.31	.39	-.01	.10	.09	.16
S2-	.56	.06	-.00	.41	.15	.29		.32	.26	.33	.10	.10	.20
S3-	.42	-.11	.21	.16	.11	.31	.32		.23	.15	.35	.14	.00
S4-	.57	.06	-.05	.43	.10	.39	.26	.23		.05	.15	.08	.16
S5-	.01	.26	.29	.02	.40	.01	.33	.15	.05		.33	.42	.03
S6-	.01	.15	.36	-.03	.30	.10	.10	.35	.15	.33		.44	-.11
S7-	-.04	.37	.34	-.05	.57	.09	.10	.14	.08	.42	.44		.09
S8-	.51	.15	-.16	.39	.23	.16	.20	.00	.16	.03	-.11	.09	

B. Comparisons Among Respondents

1. College vs University Faculty Members

To test for differences between College and University faculty in attitudes toward research, the mean scores of the two groups on the 13 dimensions of attitudes were compared using multivariate analysis.

Table 4 reports the means, the standard deviations and the difference between the means of the two groups on the 13 variables, expressed in standard deviation units. Table 5 reports the results of the multivariate and the univariate tests.

As can be seen from Table 4 the F values for the multivariate tests and for eleven of the univariate tests had high probabilities to occur by chance. Hence, the null hypothesis for the multivariate analysis and for these eleven univariate tests were accepted. The null hypothesis for differences between the means of variables G3 and S5, however, were rejected.

Looking at Table 5 it can be seen that the means for college faculty are higher than those of university faculty on both variables. To put it differently, more college faculty saw research as more free and saw theory as more potent than did university faculty. The magnitude of difference among means, however, is small. Considering this fact and the fact that the multivariate F is not statistically significant, one could not with high degree of confidence attach practical significance to the observed differences. As a result, it was considered not unreasonable to conclude that the two groups did not differ substantially in their attitudes toward research.

TABLE 4

UNIVERSITY VS. COLLEGE EDUCATORS: MEANS, STANDARD DEVIATIONS, AND DIFFERENCE BETWEEN MEANS IN STANDARD DEVIATIONS UNITS

VARIABLE	MEANS		S.D.		$\frac{\bar{X}u - \bar{X}c}{\sigma_w}$
	U	C	U	C	
G_1	4.81	4.80	0.77	0.93	.00
G_2	5.29	5.49	0.82	0.78	-.24
G_3	3.93	4.42	1.23	1.08	-.41
G_4	4.34	4.33	.80	.86	.02
G_5	5.56	5.73	.70	.70	-.24
S_1	5.40	5.17	.84	1.13	.24
S_2	4.98	5.30	1.31	1.18	-.26
S_3	4.08	4.14	.91	1.10	-.06
S_4	4.78	4.85	1.00	.98	-.08
S_5	4.62	5.10	1.19	1.07	-.42
S_6	4.50	4.74	.92	.85	-.26
S_7	5.12	5.22	.67	.74	-.14
S_8	4.35	4.62	1.01	1.14	-.26

Table 5

COMPARISONS AMONG UNIVERSITY AND COLLEGE FACULTY

A. MULTIVARIATE TEST

B. UNIVARIATE TESTS

A. Multivariate Test

F ratio = 1.5846
Degrees of Freedom = 13, 134
P less than .097

B. Univariate Tests

Variable	Error Mean Square	Hypothesis Mean Square	Univariate F	P
G1	.6866	.0005	.0007	.9784
G2	.6458	1.2387	1.9180	.1682
G3	1.4033	7.2387	5.3941	.0216*
G4	.6696	.0075	.0112	.9160
G5	.4928	.9293	1.8856	.1719
S1	.8880	1.6661	1.8762	.1729
S2	1.6158	3.4697	2.1460	.1431
S3	.9551	.1292	1.1353	.7136
S4	.9874	.2033	.2059	.6508
S5	1.3382	7.6030	5.6814	.0158*
S6	.8039	1.8106	2.2520	.1357
S7	.4840	.3043	.6288	.4291
S8	1.1081	2.4252	2.1884	.1413

Degrees of Freedom for hypothesis 1
Degrees of Freedom for error 146
*Significant tests

The absence of differences among these two groups of educators may on the surface be counter to expectations since traditionally university faculty are expected to engage in research. However, as Fattu (1960) reported, most faculty publications are not research outcomes. To put it differently, the indicators seem to agree that while university faculty are expected to do more research as compared with college faculty, the reality is that they merely publish more. In attitudes, as well as in the nature of publications, university faculty do not seem to differ significantly from their counterparts on college campuses.

Caution in making such a generalization may, however, be due. Individuals who have favorable attitudes toward research tend to respond to research instruments and those who do not value research often refuse to do so. Accordingly, the respondents from both institutions were those who favor research and were not different in attitudes. In this case also an index of differences between college and university faculty in attitudes toward research may be represented in the proportion of respondents. Since in the present study proportionately more university faculty did respond to the instrument than college faculty there is a chance that the faculty in the two types of institutions are really similar. But because of the limitations in sampling here, a conclusion about the nature of differences must be considered tentative and must await further evidence.

2. Part-Time vs. Full-Time Graduate Students

Table 6 reports the means of responses of part and full-time graduate students, standard deviations and the differences among the means expressed in standard deviation units, on the thirteen dimensions of attitudes. Table 12 reports the results of the multivariate and univariate tests.

As can be seen in Table 7, the F ratio for the multivariate test has a probability to occur by chance less than .0001. Thus the null hypothesis was rejected in favor of the alternate hypothesis, namely that significant differences in attitudes toward research exist between the two groups of respondents.

The univariate tests show that the differences occur between the means of 9 out of the 13 dimensions of attitudes. Checking Table 6 one can see that in five of these dimensions (G1, G4, S2, S4 and S8) part-time students had higher mean scores than full-time students. The opposite occurred in the means of G3, S3, S6 and S7.

Looking beyond mere differences in the mean scores, the picture is less clear. Part-time students seemed to see research in general as more engaging, productive effort (G1); that its results are more decisive (G4), that educational research is valuable (S2); that experimental-science endeavor is exceptional (S4); and that the results of experimental-science are potent and conclusive (S8). On a first impression, this seems to reflect a healthier attitude toward research among part-time graduate students than by full-time students. On a second and deeper examination of such feelings it may reflect misconceptions. Instructors of less sophisticated students, such as those enrolled in a first course in research, recognize that these students often talk about research as a tool for "proving" their hunches rather than testing the plausability of hypotheses. These students also see

Table 6

FULL-TIME VS. PART-TIME GRADUATE STUDENTS:

MEANS, STANDARD DEVIATIONS, AND DIFFERENCES BETWEEN

MEANS IN STANDARD DEVIATION UNITS

Variable	Means		S.D		$\frac{\bar{X}F - \bar{X}p}{\sigma w}$
	F	P	F	P	
G1	3.9629	4.4534	.6862	.7580	-.6731
G2	5.3767	5.4617	.6275	.6585	-.1317
G3	4.3274	3.8499	1.0045	1.1492	.4379
G4	3.6213	4.3513	.8350	.8929	-.8401
G5	5.6553	5.6012	.8504	.7689	.0673
S1	4.4773	4.2987	.9594	1.1399	.1674
S2	4.6361	4.9048	1.1735	1.1570	-.2308
S3	3.6938	3.5065	.7675	.9719	.2101
S4	4.1183	4.4527	.9326	1.0774	-.3279
S5	5.2071	5.1530	1.1297	1.0095	.0510
S6	4.6144	4.3463	.8125	.9405	.3017
S7	5.2302	4.9685	.7738	.7430	.3461
S8	3.7963	4.2950	.8199	.9851	-.5427

Table 7

COMPARISONS AMONG FULL AND PART-TIME GRADUATE STUDENTS

A. MULTIVARIATE TEST

B. UNIVARIATE TESTS

A. Multivariate Test

F ratio = 9.5993
Degrees of Freedom = 13, 386
P less than .0001

B. Univariate Tests

Variable	Error Mean Square	Hypothesis Mean Square	Univariate F	P
G1	.5308	23.4687	44.2125	.0001*
G2	.4168	.7052	1.6918	.1942
G3	1.1892	22.2539	18.7132	.0001*
G4	.7551	52.0174	68.8868	.0001*
G5	.6469	.2860	.4422	.5065
S1	1.1393	3.1146	2.7336	.0991
S2	1.3559	7.0448	5.1993	.0232*
S3	.7945	3.4236	4.3092	.0386*
S4	1.0381	10.8900	10.4917	.0013*
S5	1.1277	.2859	.2536	.6149
S6	.7898	7.0146	8.8812	.0031*
S7	.5717	6.6858	11.6938	.0007*
S8	.8445	24.2774	28.7481	.0001*

Degree of freedom for error 398; for hypothesis 1
*Significant tests

test of significance as giving conclusive evidence, rather than probabilities that the observed differences are products of chance. At any rate, they also often look at research as a glorified task. The data obtained in the present study, however, are not explicit enough to allow a clear examination of these feelings.

In contrast with part-time students, full-time graduate students seemed to see that research as more free (G3); that technical phases of research such as measurement and technical reports as more exciting and creative (S3); that theory is potent and substantiated (S6); and that measurement and quantitative data are potent tools in making research decisions (S7).

Combining all observations, one is more inclined to see that full-time graduate students, even with their lower mean ratings on five variables, have a more tempered and realistic attitude about the role of research and its ability to produce conclusive results. They "certainly" have a more favorable outlook toward expericism.

3. Education vs. Psychology Undergraduates in Colleges and Universities

Table 8 reports the means, the standard deviations of the scores for the thirteen variables as given by undergraduate students. It also reports the differences between means expressed in standard deviation units. Table 9 reports the results of the multivariate analysis test. The univariate tests for differences between education and psychology students are reported in Table 10 and between University and College undergraduates are reported in Table 11.

Table 8

UNDERGRADUATES: MEANS AND DIFFERENCES

BETWEEN MEANS IN STANDARD DEVIATION UNITS DIFFERENTIATED

BY MAJOR AND BY INSTITUTIONAL SETTING

Variable	Major			Setting		
	Means			Means		
	Ed.	Psy.	$\frac{\bar{X}E - \bar{X}p}{\sigma w}$	U	C	$\frac{\bar{X}U - \bar{X}c}{\sigma w}$
G1	4.099	4.115	-.1010	3.713	4.282	-.8107
G2	5.326	5.373	-.0753	5.470	5.296	.2256
G3	4.177	4.249	.0460	4.552	4.062	.5063
G4	3.986	3.910	-.0705	3.473	4.159	-.8130
G5	5.547	5.656	-.0697	5.699	5.558	.1668
S1	4.107	4.501	-.3768	4.079	4.405	-.3795
S2	4.867	4.750	.0853	4.568	4.915	-.2950
S3	3.435	3.476	.0359	3.388	3.486	-.0938
S4	4.350	4.265	.0742	4.082	4.408	-.2838
S5	5.246	5.283	-.0230	5.274	5.260	.0121
S6	4.321	4.501	-.1192	4.562	4.343	.2446
S7	4.894	5.240	-.3537	5.330	4.949	.4734
S8	3.849	4.032	-.2227	3.648	4.142	-.6102

Table 9

MULTIVARIATE COMPARISONS AMONG UNDERGRADUATES

EFFECT*	d.f.	F	P
Setting: Education vs. Psychology	13, 462	8.6494	.0001
Major: University vs. College	13, 462	4.9407	.0001
Interaction: Major x Setting	13, 462	1.3445	.1836

*Effect of Setting estimated by partialling out major
and effect of Major estimated by partialling out setting

Table 10

COMPARISONS BETWEEN EDUCATION AND PSYCHOLOGY UNDERGRADUATES

PARTIALING OUT EFFECT OF INSTITUTIONAL SETTING

Variable	Error Mean Square	Hypothesis Mean Square	Univariate F	P Less Than
G1	.5061	1.3592	2.6853	.1020
G2	.4933	.0468	.0948	.7584
G3	.9958	.0040	.0040	.9498
G4	.7463	.1222	.1638	.6859
G5	.6651	.9292	1.3971	.2379
S1	1.0526	24.5255	23.3004	.0001*
S2	1.2067	.4730	.3920	.5316
S3	.6921	.3836	.5543	.4570
S4	1.1491	.1419	.1235	.7255
S5	1.0347	.1489	.1439	.7046
S6	.7276	2.6003	3.5736	.0594
S7	.5169	10.0946	19.5274	.0001*
S8	.7681	3.1804	4.1408	.0425*

*Significant at .05 level.
d.f. for hypothesis 1
d.f. for error 474

Table 11

COMPARISONS AMONG UNIVERSITY AND COLLEGE UNDERGRADUATES

PARTIALING OUT EFFECT OF MAJOR

Variable	Error Mean Square	Hypothesis Mean Square	Univariate F	P Less Than
G1	.5062	34.3506	67.8661	.0001*
G2	.4933	2.8528	5.7835	.0166*
G3	.9958	23.8547	23.9551	.0001*
G4	.7463	47.3763	63.4831	.0001*
G5	.6651	1.5360	2.3094	.1293
S1	1.0525	17.0176	16.1675	.0001*
S2	1.2066	11.1302	9.2240	.0026*
S3	.6920	1.1639	1.6818	.1954
S4	1.2491	10.1054	8.7945	.0032*
S5	1.0347	.0062	.0060	.9382
S6	.7276	3.6371	4.9986	.0259*
S7	.5169	10.5136	20.3381	.0001*
S8	.7681	27.1777	35.3846	.0001*

*Significant at .05 level.
d.f. for hypothesis 1
d.f. for error 474

As can be seen in Table 9, the F ratio for interaction had a high probability to occur by chance. Thus, the null hypothesis about the interaction of the academic major with the instructional setting was accepted. The F ratios for the comparisons between scores of students by academic majors, and by institutional settings were, however, significant and the null hypotheses were rejected.

Considering the differences related to academic major, Table 10 shows that education students differed from psychology students on three attitude variables: S1, S7 and S8. An examination of Table 8 shows that in each of the three cases psychology students had a higher mean value than education students. Based on these means it is obvious that psychology students, as compared with education students expressed a more favorable attitude toward theory (S1), seeing it as creative and exciting; and toward technical data (S7), experimentation and science (S8) seeing them as potent tools in making decisions.

In the comparisons between university and college students (see Table 11) differences occurred relative to ten out of the thirteen variables. These are the attitude variables: G1, G2, G3, G4, S1, S2, S4, S6, S7, and S8. Checking Table 8 one can see that on three of these variables university students had higher means than college students; the complexity of research (G2); its freeness (G3); and the potency of technical data (S7). On all the other seven, college students had higher means. Compared with university students, college students saw research as more engaging and productive (G1); its results more decisive (G4); theory as more creative (S1); science as more exceptional (S4); and also more potent (S8).

The differences among psychology and education students, as observed in the present study, may be interpreted in terms of differences in curricular content. Psychology students, regardless of where they study, are expected to study theories, statistics, measurement and experimental psychology. Accordingly they have a more favorable outlook to empirical data. Education students get only a limited amount of exposure to theory and empirical research and in turn they do not see these areas as necessarily potent.

A more striking finding, however, relates to the way college undergraduates differed from university undergraduates. In several respects undergraduates in colleges and part-time graduate students were comparable in their attitudes toward research and different from undergraduates in universities and full-time graduate students in education. They tended to see research as engaging, productive; its results more decisive; its outcomes more valuable; and to see experimental science as exceptional and its results more potent. At the same time, they saw research more restrictive or at least less free; measurement and technical reports as less exciting and quantitative data as less potent or probably less essential in making decisions. While interpretation of such differences must be approached with caution, the impression one gets is that college students and part-time graduate students view research effort with a halo around it. They attach to it a high degree of respectability but that respectability is not based on true understanding of research as the process of arriving at successive approximations to the truth through accurate measurement, and through testing hypotheses.

Two more observations seem also to support the above contention. First, psychology students who tend to receive more training in theory and empirical research, regardless of the institution where they study, showed more favorable attitude toward theoretical and quantitative aspects of research than did education students. The second observation is derived from the study of attitudes associated with faculty interest in research among small colleges (Sefein, 1970). In that study faculty members who expressed interest in research as compared with those who did not, saw testing survey and experimentation as more intellectually demanding but potent tools. They also saw evaluation of more utility.

III. SUMMARY, CONCLUSIONS AND PROBLEMS

A. Summary and Conclusions

The present study attempted to relate the development of attitudes toward educational research with two variables in training, namely: (1) institutional setting; and (2) courses usually associated with research training. It compared the attitudes of faculty members in universities where research is expected, with those of college faculty where research is not emphasized - to see if the attitudes of the two groups of faculty members were indeed different. It compared the attitudes of full-time graduate students with those of part-time graduate students to see if full-time students were indeed more favorably oriented toward research. It compared undergraduates in education with undergraduates in psychology to see if preparation in research related courses is associated with differential attitudes toward research. Finally, it compared the attitudes of college undergraduates in education and psychology with those of their counterparts on university campuses to detect if institutional setting was associated with variations in student attitudes.

Comparisons between faculty members showed little if any difference among the attitudes of university and college faculty. While this finding ran counter to expectations, it was explained by two factors. One is the probability that the two groups do not indeed differ in attitudes toward research and that the assumed difference is basically related to the amount of publications produced by the two groups. The second is that differences may have been masked by non-responses. Since respondents to a research instrument tend to be favorably oriented toward research the two groups of respondents studied here may be indeed similar.

Comparisons between full-time and part-time graduate students showed that the two groups did indeed differ in attitudes toward research. Part-time students compared with full-time graduate students rated educational research higher in creativity potency and value; but they rated the technical and quantitative aspects of research as lower in creativity and potency. Since quantification is an essential component of research differences part-time students were seen to have novice respect to research coupled with misconceptions about its nature and outcomes.

Comparisons between seniors in psychology and in education did confirm to the expectations, namely, that academic training in quantitative methods was associated with a more favorable disposition toward these topics. The comparisons, however, indicated that training in courses related to research may not have a generalized effect on the attitudes toward research.

Comparisons between college and university undergraduates showed several differences in the attitudes of the two groups toward research. The differences were similar in pattern to those found among part-time and full-time graduate students. Essentially they reflected a less sophisticated understanding of emperical research among college as compared with university undergraduates. In the absence of clear differences in the curricular requirements for the two groups of teacher trainees and in the absence of measurable attitude differences between the faculty of the two institutions, the observed differences were not directly explainable. They may be related to the characteristic of students who patronize the two types of institutions. More research is needed on that matter.

In conclusion, the study suggests two points. On one side it suggests that college students as compared with university students, and part-time as compared with full-time graduate students are less tolerant with theory and do not value quantitative inquiries properly. Indirectly also, the similarity between undergraduates in colleges and part-time graduate students suggests that graduate training programs for teachers do not, on the whole, change the attitudes of teachers toward research. On the other side, the study suggests that training in quantitative techniques such as that given to psychology majors, does affect trainees attitudes toward quantitative procedures.

These conclusions pose a challenge to teacher educators at all institutions. Teacher educators cannot expect the teacher to develop into the problem solver they advocate, spontaneously. They must modify the curriculum to provide teacher trainees with the proper problem solving skills. The challenge is particularly serious in small colleges where entering students may be initially less tolerent toward theories than their counterparts at large universities. Without specific preparation in research, teachers will continue to approach problems intuitively, rather than empirically, and prolong if not compound the problems of education for many years to come.

B. Limitations and Problems

The present study included several limitations. Some of these limitations are related to the design. Others are related to the particular instrument used. Thus, more research is needed to refine the conclusions suggested by the study.

1. The Design

In the design, probably the major limitation was in the sampling of subjects and its effect on the generalizability of results. More data are needed on the background of respondents and non-respondents. The non-respondents particularly pose a serious problem for they tend to have less favorable attitudes toward research yet their attitudes are not properly represented in the data.

Another limitation in design involved the lack of sampling of entering students in colleges and universities. In which way do students who seek admission in colleges differ from those who favor large universities? A comparison between entering students with graduating seniors would give us an assessment of the effectiveness of training. Furthermore, if teacher education students entering colleges are different from those entering universities, differential curricula may be needed to produce the desired outcomes in teachers.

A third limitation was the absence of a reference group or criterion with which the responses of the subjects could be compared. A norm measure of researchers' responses would have been helpful to compare other samples with. This limitation became particularly obvious at the time of analysis and seemed to be especially serious in Semantic Differential Scales. For example, does a researcher see measurement as deep, shallow or inbetween? How conclusive does he see the role of a technical report? Obviously norms of that sort would be helpful in reflecting on the attitudes of various groups of respondents.

2. The Measuring Instrument

The measuring instrument posed several problems. One of these is related to the use of linguistic contrasts in Semantic Differential scales. Linguistic contrasts obviously were not seen as functional antonyms by many subjects. Lack of functional antonomy between the adjectives representing the extreme points of the scale affects the linearity of the scales and in turn poses serious measurement problems.

Another problem is related to concept-scale interaction, and the way the scales clustered after factor analysis. Through the use of synonyms and related terms the instrument presumably contained four attitude dimensions (factors) identified earlier (Sefein, 1970). However, factor analysis produced clusters different from those which were originally anticipated. Whether this outcome represents a linguistic problem or a methodological problem in factor analysis is not clear. But the stability of attitude constructs measured by the instrument is obviously an issue in Semantic Differential scaling.

A third problem is related to the interaction among the concepts and the scales. Statistically the interaction can be resolved by analyzing data over the strung variables i.e., concepts x scales. Psychologically, however, this analysis poses a problem especially in cases such as in the present study where the concepts are presumably related and are considered as replicated measures of a higher order construct, namely empirical research. When concepts are related, the psychological entities the factors are presumed to represent become diffused, and interpretation of their meaning becomes difficult.

REFERENCES

Buswell, G. & McConnell, T.R. Profiles of Educational Researchers. Educational Researcher. June 1966.

Buswell, G.T., McConnell, T.R., Heiss, A.M., and Knoell, D.M. Training for Educational Research. Final Report, Cooperative Research Project No. 51074. Berkeley: Center for the Study of Higher Education, University of California. 1966.

Carter, R.F., Ruggles, W.L. and Chaffee, S.H. The Semantic Differential in Opinion Measurement. Public Opinion Quarterly. 32:666-74, 1968.

Fattu, N. A Survey of Educational Research at Selected Universities. In F.W. Banghart (Ed.) First Annual Phi Delta Kappa Symposium on Educational Research. Bloomington, Indiana: Phi Delta Kappa, 1960.

Heise, D.R. Some Methodological Issues in Semantic Differential Research. Psychological Bulletin. 72:406-422, 1969.

Keppel, Francis. Research Education's Neglected Hope. Journal of Reading. 8, 3-9, October 1964.

Krathwohl, D.R. Current Formal Patterns of Education Emperically Oriented Researchers and Methodologists. In E. Guba and S. Elam (Eds.) The Training and Nurture of Educational Researchers: Sixth Annual Phi Delta Kappa Symposium on Educational Research. Bloomington, Indiana: Phi Delta Kappa, 1965.

Lazarsfeld, P. & Sieber S. Organizing Educational Research. Englewood Cliffs, N.J.: Prentice-Hall, 1964.

Maguire, T.O. Semantic Differential Methodo-ogy for the Structuring of Attitudes. American Educational Research Journal, 10, 295-306, 1973.

Mardkoff, A.M. An Emperical Test of the Functional Antonymy of Semantic Differential Scales. Journal of Verbal Hearing and Verbal Behavior, 2, 504-508, 1963.

Mardkoff, A.M. Functional vs. Nominal Antonymy in Semantic Differential Scales. Psychology Reports. 16, 691-2, 1965.

Messick, S.J. Metric Properties of the Semantic Differential. Educational and Psychological Measurement. 17, 200-206, 1957.

Osgood, C., Suci, G., and Tennenbaum, P. The Measurement of Meaning. Urbana, Ill.: University of Illinois Press, 1957.

Sefein, N.A. The Semantic Structure Certain Educators Associate with Research Related Concepts. Paper presented at the Annual Meeting of the Educational Research Association of New York State. Concord Hotel, 1969.

Sefein, N.A. Consortium on Research Development Program (CORD) for the State University Colleges at Buffalo and at Fredonia, New York and Gannon College at Erie, Pa. Final Report. Cooperative Research Project No. 7-1015, Fredonia, N.Y.: State University College, 1970. ERIC #ED07011

APPENDICES

APPENDIX A

INSTRUMENTS USED IN DEVELOPING THE SEMANTIC DIFFERENTIAL SCALES

1. Free Response Forms
2. Multiple Choice Form
3. A Sample of the Instrument Used

STATE UNIVERSITY COLLEGE • FREDONIA, NEW YORK 14063

Dear Volunteer:

You are being asked to assist in developing an instrument for rating a set of concepts. The instrument consists of a set of scales, and each scale is defined by two adjectives representing its extreme points. The following pair of adjectives is an example of such a scale:

good_____ _____ __bad

Since some linguistic contrasts do not essentially represent functional antonyms, your help is being solicited here. On the attached sheets you are asked to perform two tasks. First, you are asked to write an antonym for each of the adjectives given. (In giving the antonym please avoid those which can be developed by adding or deleting prefixes such as un___, in___, etc.)

The second task you are requested to complete is that of judging whether the scale which resulted in the first step is suitable for rating a set of concepts. Thus, after you provide the antonym for an adjective, go over the list of concepts that follows it and check (✓) those concepts which could be appropriately rated by the scale.

Should you feel in the process of checking the appropriateness of a scale to the concepts that the scale could be made more suitable by using an antonym other than the one you wrote first, feel free to cross out the previous choice and write the new antonym.

You need not waste extensive time over any scale. But please do give the task your serious attention. Also please do NOT omit responding to any part of the instrument. Thank you for your cooperation.

Sincerely,

Naim A. Sefein
Professor of Educational Psychology

NAS:p
Encs.
OE Project I-B-100

SCALES ADJECTIVE — ANTONYM	CONCEPTS CURRICULUM	PUBLICATION	INSTRUCTION	MEASUREMENT	SCIENCE	THEORY	SURVEY	STATISTICS	EXPERIMENT	EDUCATIONAL RESEARCH	INTUITION	ART
1. Original ———												
2. Novel ———												
3. Fresh ———												
4. Imaginative ———												
5. Creative ———												
6. Fertile ———												
7. Free ———												
8. Hampered ———												
9. Conclusive ———												
10. Authoritative ———												
11. Substantiated ———												
12. Explicit ———												
13. Decisive ———												
14. Definitive ———												
15. Systematic ———												
16. Illuminating ———												

SCALES ADJECTIVE — ANTONYM	CONCEPTS CURRICULUM	PUBLICATION	INSTRUCTION	MEASUREMENT	SCIENCE	THEORY	SURVEY	STATISTICS	EXPERIMENT	EDUCATIONAL RESEARCH	INTUITION	ART
17. Complex ———												
18. Elementary ———												
19. Shallow ———												
20. Primitive ———												
21. Difficult ———												
22. Tiresome ———												
23. Cumbersome ———												
24. Intricate ———												
25. Useless ———												
26. Futile ———												
27. Valueless ———												
28. Inoperable ———												
29. Unimportant ———												
30. Dispensable ———												
31. Worthless ———												
32. Trifling ———												

Appendix A - 2

Multiple Choice Form

STATE UNIVERSITY COLLEGE
FREDONIA, NEW YORK

Dear Volunteer:

You are being asked to assist in developing an instrument for rating a set of concepts related to research. The instrument consists of a set of scales. The extreme points of each scale are defined by two antonyms (opposites).

The respondent indicates his feeling toward the concept by placing a mark on the scale. For example, on a scale such as good - bad, if the respondent feels that "research" is somewhat good he marks the scale as follows:

Good _____ x _____ Bad

And if he feels that it is definitely good he marks the scale as follows:

Good x _____ Bad

(The closer the mark is to "Good" the stronger his feelings are.) If, however, he feels "research" is bad he would place his mark in the same fashion as above but at a point between the center and "Bad" such as:

Good _____ x _____ Bad

Since not all adjectives can appropriately serve as descriptors of the concepts being rated, and since some antonym pairs may not directly represent the extreme points of a scale, your help is being solicited in responding to the attached instrument.

The instrument consists of a list of adjectives and antonyms being considered for constructing the scales. They are arranged in the form of multiple-choice items. Each adjective is followed by four antonyms. After reading the adjective you are to select the antonym which in your judgment would best serve as the other extreme of the scale.

Before you begin to choose the antonyms, however, please read the list of concepts listed at the top of the page so that you keep in mind what the scales are going to be used for. After reading the concepts, go to the instrument. Read the given adjective and its choices. Circle the antonym of your choice and also mark the space on the optical scanning answer sheet which corresponds to your choice.

When you finish responding to the 32 adjective items go back to the first item. Read the adjective and the antonym you chose to form the scale. Then think of the concepts. If you think the scale could somehow be used in rating the concepts mark T on item 41 of the answer sheet. If you think that the scale is not appropriate for rating the concepts, mark F. Do the same for the remaining 31 scales and mark your responses on items 42-72 of the answer sheet.

When you finish please recheck to see that you have made a response on the answer sheet to every one of the items 1-32 and 41-72 before you hand back the materials you have.

Thank you for your cooperation and help.

Sincerely,

N. Sefein
Professor of Educational Psychology

USOE Project 1R100 - 10/29/71

The concepts to be rated are: hypothesis, technical report, measurement, science, theory, statistics, experiment, educational research.

I. Please read each item below and mark your choice of the antonyms on both this form and the answer sheet.

1. deep

a. crude
b. obvious
c. shallow
d. superficial

2. stimulating

a. deadening
b. retarding
c. unnerving
d. wishy-washy

3. beneficial

a. damaging
b. deleterious
c. harmful
d. noxious

4. functional

a. inoperative
b. nonutilitarian
c. unhelpful
d. unusable

5. exciting

a. boring
b. dense
c. tedious
d. tiring

6. illuminating

a. bewildering
b. darkening
c. obscure
d. unclear

7. valuable

a. dispensable
b. unnecessary
c. wasteful
d. worthless

8. elaborate

a. austere
b. inornate
c. natural
d. unpretentious

9. original

a. cliche
b. imitative
c. redundant
d. stereotyped

10. authoritative

a. dubious
b. tentative
c. unconvincing
d. unofficial

11. common

a. exceptional
b. indistinct
c. infrequent
d. obscure

12. simple

a. abstruse
b. arduous
c. complex
d. compounded

13. exacting

a. lax
b. lenient
c. loose
d. mild

14. significant

a. immaterial
b. inconsequential
c. irrelevant
d. unessential

15. fresh

a. banal
b. hackneyed
c. stale
d. trite

16. decisive

a. debatable
b. doubtful
c. groundless
d. indeterminate

17. substantiated

a. ambivalent
b. disputable
c. questionable
d. unstable

18. creative

a. barren
b. sterile
c. unimaginative
d. uninventive

19. free

a. confined
b. hampered
c. restrained
d. restricted

20. practical

a. theoretical
b. unrealistic
c. unworkable
d. useless

21. objective

a. biased
b. interpretative
c. opinionated
d. subjective

22. novel

a. common
b. customary
c. ordinary
d. usual

23. conclusive

a. invalid
b. refutable
c. uncertain
d. unconfirmed

24. meaningful

a. aimless
b. designless
c. purposeless
d. senseless

25. systematic

a. chaotic
b. disorderly
c. random
d. unstructured

26. easy

a. difficult
b. intricate
c. labored
d. onerous

27. basic

a. involved
b. knotty
c. labored
d. snarled

28. helpful

a. hampering
b. hindering
c. impeding
d. inhibiting

29. definitive

a. ambiguous
b. changeable
c. fallacious
d. provisional

30. fundamental

a. apparent
b. primitive
c. secondary
d. subordinate

31. profitable

a. fruitless
b. gainless
c. rewardless
d. unrewarding

32. imaginative

a. dull
b. matter-of-fact
c. prosaic
d. stagnant

II. Please go back to the beginning. Examine the adjective pairs representing each scale. If you consider the scale appropriate for rating the concepts mark T. If inappropriate mark F. Record your responses on Items 41-72 on the answer sheet.

PERCENTAGE OF JUDGES CHOOSING VARIOUS ANTONYMS[1]

AND JUDGING SCALES AS RELEVENT[2]

Objective	Antonym Choice				Relevency
	A	B	C	D	
1. Deep	1	2	62	36	68
2. Stimulating	50	34	6	11	73
3. Beneficial	32	14	51	3	86
4. Functional	36	23	12	28	85
5. Exciting	78	2	18	2	71
6. Illuminating	14	27	36	22	76
7. Valuable	7	7	5	81	91
8. Elaborate	22	39	9	30	43
9. Original	5	55	18	22	67
10. Authoritative	18	6	28	47	43
11. Common	67	2	22	8	65
12. Simple	4	3	92	1	92
13. Exacting	29	38	30	3	51
14. Significant	14	22	58	6	94
15. Fresh	4	17	71	8	59
16. Decisive	17	35	11	37	69
17. Substantiated	7	29	54	9	78
18. Creative	3	6	68	23	75
19. Free	36	3	11	50	63
20. Practical	31	28	23	18	82
21. Objective	35	2	4	58	88
22. Novel	23	10	47	20	57
23. Conclusive	13	23	24	40	78
24. Meaningful	16	4	38	42	80
25. Systematic	31	25	20	24	89
26. Easy	87	6	6	2	73
27. Basic	83	3	8	5	50
28. Helpful	19	56	9	16	71
29. Definitive	79	10	7	4	77
30. Fundamental	3	3	62	33	62
31. Profitable	40	17	7	36	79
32. Imaginative	57	9	7	27	65

1 N = 120

2 N = 89

Appendix A - 3

A Sample of the Final Instrument

STATE UNIVERSITY COLLEGE • FREDONIA, NEW YORK 14063

Dear Respondent:

You are being asked to assist in a study which attempts to find out what meanings various groups associate with some concepts. In studies of that sort, there are no right or wrong answers and the results are merely expressed as a summary of how various groups view the concepts. Thus, the identity of the individual respondent is always maintained in strict confidence.

The response sheets used in the study are planned so all the data can be handled by electronic processes. This requires that you mark your responses by marking dark lines inbetween the appropriate brackets or boxes using Number 2 pencils. The following directions explain how this is done.

Thank you for your cooperation.

Sincerely,

Naim A. Sefein
Professor of Educational Psychology

NAS/mta

This study is partially supported by funds from the U. S. Office of Education Grant No. OEG 2710100

DIRECTIONS

61933

A. Coding the Response Sheets

There are five response sheets. In order for the machine to detect which sheets belong together, they have to be coded. The coding areas are shaded grids on the top of the response sheets – a large one containing alphabetical letters and a small one containing numbers. Only page one is to be coded in full, the other pages merely require marking the page number and the respondent's code number.

The process of coding is simple. It requires blackening *only* one space in each column as directed below. (An example of completed grid is given at the end of the directions to assist those who are unfamiliar with the process).

Start with the Alphabetical Grid on page 1.

Institution: In column 1 under institution please *blacken*

C *if your institution is a* **College**
U *if your institution is a* **University**

Respondent: In columns 1 and 2 under respondent *blacken*

F S *if you are a* **Full-time Student**
P S *if you are a* **Part-time Student**
F M *if you are a* **Faculty Member**

Preparation: In columns 1, 2 and 3 under preparation, if you are

Undergraduate student in Education *blacken*

U E E *if your major is* **Elementary Education**
U S M *if your major is* **Secondary Math-Science**
U S S *if your major is* **Secondary Social Studies**
U S L *if your major is* **Secondary Languages**

Undergraduate student in Liberal Arts *blacken*

U P S *if you major in* **Psychology** or **Sociology**
U N S *if you major in* **Natural** or **Physical Science**
U A H *if you major in* **Arts** or **Humanities**

Graduate student in Education *blacken*

G E C *if you major in* **Elementary Education Curriculum**
G S C *if you major in* **Secondary Education Curriculum**
G E A *if you major in* **Educational Administration**
G E P *if you major in* **Educational Psychology**
G E O *if you major in* an area other than the above

Faculty member *blacken*

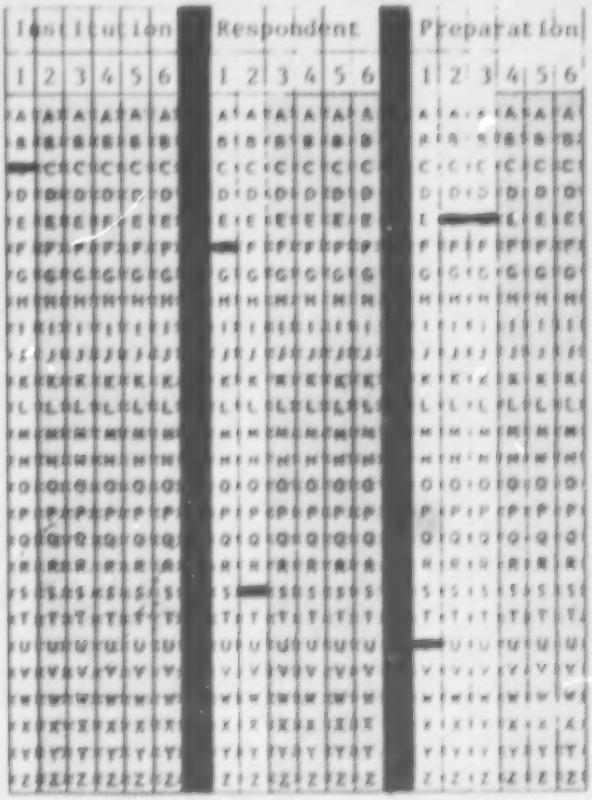
F E C *if your area is* **Elementary Education Curriculum**
F S C *if your area is* **Secondary Education Curriculum**
F E A *if your area is* **Educational Administration**
F E P *if your area is* **Educational Psychology**
F E O *if your area is* an area other than the above.

Next go to the numerical grid on page 1.

1. Under **Page** *blacken* the space corresponding to the page number.
2. Under **Code No.** *blacken* the spaces corresponding to the number stamped at the top of your *Directions* sheet.
3. Under **Date** of response *blacken* the numbers corresponding to the **day**, the **month**, and the last two numerals designating the **year**.

Finally, go to the numerical grid of all other pages.

1. Under **Page** *blacken* the space corresponding to the page number.
2. Under **Code No.** *blacken* the spaces corresponding to the number stamped on your *Directions* sheet.



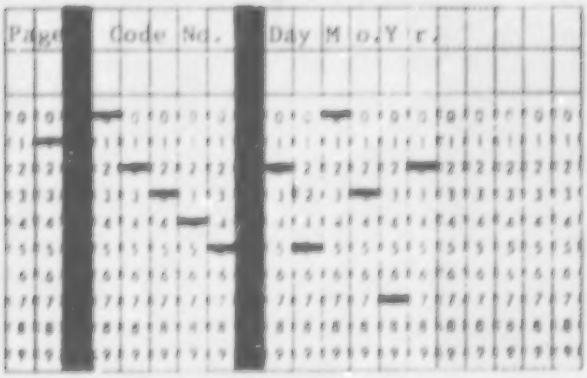
EXAMPLE:

The Alphabetical grid to the right is completed for

College

Full-time Student

Undergraduate, Elementary Education



The Numerical grid to the right is completed for

page 1

Code no. 0 2 3 4 5

Date 25, 03, 72

B. Responding to the Instrument

The instrument consists of ten concepts to be rated on several scales. To break the monotony of work the concepts and the scales are arranged in small clusters -- the concept printed in block letters on the top is followed by four scales. The scales are defined by two adjectives separated by seven (7) boxes in which you mark your response.

Here is an example of how you are to use these scales:

MAN

Fair		Unfair
Strong		Weak
Active		Passive
Safe		Dangerous

If you feel that the concept MAN is *very closely related to one end of the scale*, you should blacken either the first or the last box, whichever seems appropriate:

Fair ▮ Unfair or Fair ▮ Unfair

If you feel that MAN is *quite closely, but not extremely* related to one end of the scale, you should blacken either of the boxes close to extreme as follows:

Strong ▮ Weak or Strong ▮ Weak

If the concept MAN seems only *slightly related to one side* as opposed to the other side (*but is not really neutral*), then you should blacken one of the boxes on either side of the center:

Active ▮ Passive or Active ▮ Passive

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the thing you're judging.

If you consider the concept *to be neutral* on the scale, both sides of the scale equally associated with the concept, or if the scale is *unrelated* to the concept, then you should blacken the box in the middle:

Safe ▮ Dangerous

Sometimes you may feel as though you've had the same item before on the test. This will not be the case, so DO NOT look back and forth through the items. DO NOT try to remember how you checked similar items earlier in the test. Make each item a separate and independent judgment. Work fast. DO NOT worry or puzzle over individual items. It is your first impressions, the immediate feelings about the items that we want. On the other hand, please do not be careless, because we want your true impressions.

REMEMBER

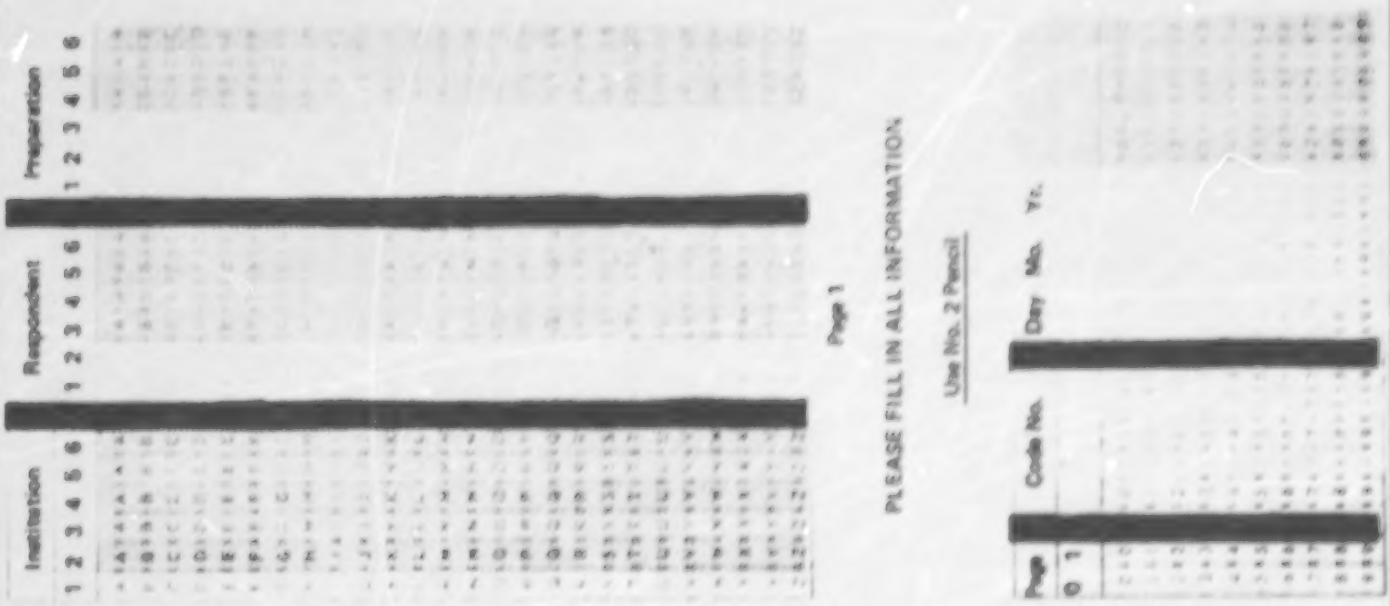
1. Use only No. 2 pencils.
2. Complete the coding information on all five sheets.
3. Check EVERY scale for EACH concept -- DO NOT OMIT ANY.
4. Make only ONE check mark for each single scale.
5. Make heavy marks filling the boxes. DO NOT make stray marks.
6. Give each item a separate and independent judgment -- your first but serious impression.
7. When finished, return response sheets in the supplied envelope.

ALL INFORMATION YOU GIVE WILL BE KEPT STRICTLY CONFIDENTIAL.

Thank you.

Sincerely,

Naim A. Sefein
Professor of Educational Psychology



TECHNICAL REPORT

Beneficial	Harmful
Unconfirmed	Conclusive
Restricted	Free
Decisive	Doubtful

EDUCATIONAL RESEARCH

Valuable	Worthless
Irrelevant	Significant
Questionable	Substantiated
Exciting	Boring

INTUITION

Restricted	Free
Beneficial	Harmful
Unconfirmed	Conclusive
Exciting	Boring

ART

Simple	Complex
Subjective	Objective
Exciting	Boring
Deep	Shallow

EXPERIMENT

Deep	Shallow
Immitative	Original
Valuable	Worthless
Questionable	Substantiated

MEASUREMENT

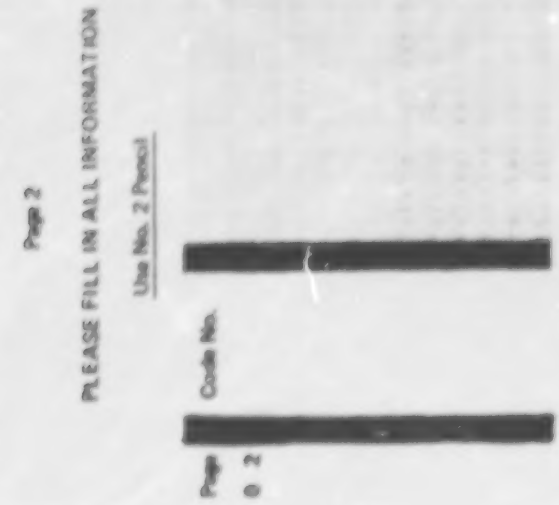
Deep	Shallow
Creative	Unimaginative
Easy	Difficult
Unconfirmed	Conclusive

ART

Valuable	Worthless
Immitative	Original
Beneficial	Harmful
Restricted	Free

TECHNICAL REPORT

Immitative	Original
Questionable	Substantiated
Easy	Difficult
Subjective	Objective



ART

Exceptional	Common
Decisive	Doubtful
Irrelevant	Significant
Creative	Unimaginative

EXPERIMENT

Irrelevant	Significant
Exceptional	Common
Simple	Complex
Hindering	Helpful

THEORY

Easy	Difficult
Hindering	Helpful
Creative	Unimaginative
Subjective	Objective

CURRICULUM

Hindering	Helpful
Creative	Unimaginative
Decisive	Doubtful
Simple	Complex

INSTRUCTION

Decisive	Doubtful
Beneficial	Harmful
Simple	Complex
Exceptional	Common

SCIENCE

Exciting	Boring
Valuable	Worthless
Unconfirmed	Conclusive
Deep	Shallow

INSTRUCTION

Questionable	Substantiated
Immitative	Original
Irrelevant	Significant
Subjective	Objective

CURRICULUM

Irrelevant	Significant
Subjective	Objective
Immitative	Original
Deep	Shallow

EDUCATIONAL RESEARCH

Unconfirmed	Conclusive
Subjective	Objective
Easy	Difficult
Beneficial	Harmful

SCIENCE

Subjective	Objective
Hindering	Helpful
Questionable	Substantiated
Beneficial	Harmful

INTUITION

Hindering	Helpful
Exceptional	Common
Valuable	Worthless
Decisive	Doubtful

THEORY

Decisive	Doubtful
Beneficial	Harmful
Exceptional	Common
Exciting	Boring

ART

Questionable	Substantiated
Easy	Difficult
Unconfirmed	Conclusive
Hindering	Helpful

INTUITION

Easy	Difficult
Subjective	Objective
Irrelevant	Significant
Questionable	Substantiated

EDUCATIONAL RESEARCH

Exceptional	Common
Immitative	Original
Deep	Shallow
Hindering	Helpful

SCIENCE

Irrelevant	Significant
Easy	Difficult
Decisive	Doubtful
Exceptional	Common

EXPERIMENT

Unconfirmed	Conclusive
Beneficial	Harmful
Restricted	Free
Decisive	Doubtful

TECHNICAL REPORT

Hindering	Helpful
Irrelevant	Significant
Exceptional	Common
Creative	Unimaginative

EDUCATIONAL RESEARCH

Simple	Complex
Decisive	Doubtful
Creative	Unimaginative
Restricted	Free

INSTRUCTION

Easy	Difficult
Hindering	Helpful
Valuable	Worthless
Unconfirmed	Conclusive

INTUITION

Creative	Unimaginative
Simple	Complex
Immitative	Original
Deep	Shallow

SCIENCE

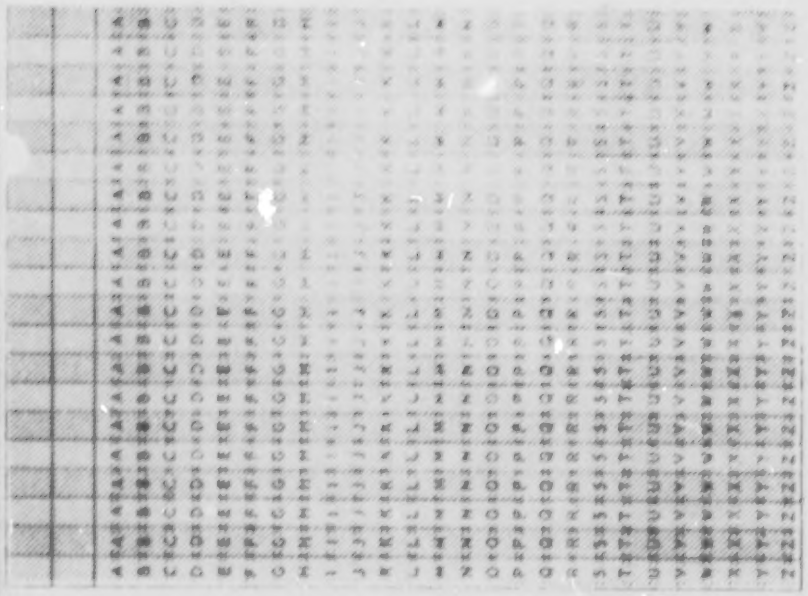
Simple	Complex
Creative	Unimaginative
Immitative	Original
Restricted	Free

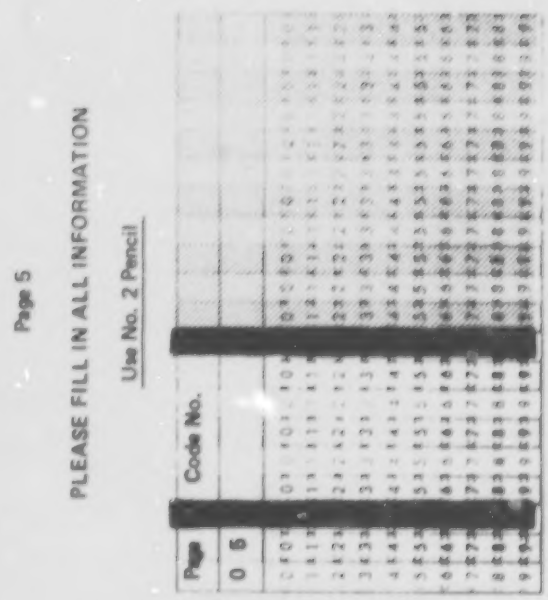
MEASUREMENT

Irrelevant	Significant
Exciting	Boring
Decisive	Doubtful
Restricted	Free

CURRICULUM

Easy	Difficult
Beneficial	Harmful
Unconfirmed	Conclusive
Valuable	Worthless





INSTRUCTION

Exciting	Boring
Deep	Shallow
Creative	Unimaginative
Restricted	Free

TECHNICAL REPORT

Exciting	Boring
Simple	Complex
Deep	Shallow
Valuable	Worthless

THEORY

Immitative	Original
Irrelevant	Significant
Deep	Shallow
Questionable	Substantiated

EXPERIMENT

Exciting	Boring
Subjective	Objective
Easy	Difficult
Creative	Unimaginative

MEASUREMENT

Exceptional	Common
Questionable	Substantiated
Beneficial	Harmful
Immitative	Original

CURRICULUM

Questionable	Substantiated
Exceptional	Common
Restricted	Free
Exciting	Boring

THEORY

Simple	Complex
Restricted	Free
Valuable	Worthless
Unconfirmed	Conclusive

MEASUREMENT

Subjective	Objective
Hindering	Helpful
Simple	Complex
Valuable	Worthless

APPENDIX B

DATA ANALYSIS TABLES

1. Tables of principal component factors rotated according to normalized varimax criterion; within groups analyses.

2. Tables of principle component factors rotated according to the normalized varimax criterion; within concepts analyses.

3. Tables of rotated factors for scales concepts analyses.

SCALE ANALYSIS OF RESPONSES BY FACULTY

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE--

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.70	-.04	-.04	.26	.14	.57
6. IMITATIVE-ORIGINAL	.34	.00	-.13	.56	.27	.52
7. CREATIVE-UNIMAGINATIVE	.78	.00	.06	.26	.16	.59
8. RESTRICTED-FREE	.02	.02	-.04	.84	-.07	.71
9. DECISIVE-DOUBTFUL	.48	.08	-.04	-.07	.70	.73
10. QUESTIONABLE-SUBSTANTIATED	.10	.68	-.11	.40	.20	.68
11. UNCONFIRMED-CONCLUSIVE	-.04	.17	-.12	.15	.85	.81
12. SUBJECTIVE-OBJECTIVE	.03	.85	-.04	-.12	.09	.76
13. DEEP-SHALLOW	-.74	.11	.20	.03	-.16	.68
14. EXCEPTIONAL-COMMON	-.69	-.01	.21	-.02	.04	.52
15. SIMPLE-COMPLEX	-.18	.02	.79	-.09	-.07	.66
16. EASY-DIFFICULT	-.00	-.09	.77	.02	-.07	.61
17. VALUABLE-WORTHLESS	.73	.40	-.07	.06	-.16	.73
18. IRRELEVANT-SIGNIFICANT	.25	.27	-.47	.48	.13	.57
19. BENEFICIAL-HARMFUL	.69	.24	-.11	.54	.12	.56
20. HINDERING-HELPFUL	.43	.05	-.45	.29	-.04	.48
SUM OF SQUARED LOADINGS	3.7	1.5	1.8	1.7	1.5	10.1
PERCENT OF SUM OF COMMUNALITIES	36.1	15.3	17.6	16.3	14.7	100.0

SCALE ANALYSIS OF RESPONSES BY COLLEGE SUBJECTS

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE--

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.60	-.02	-.79	.17	-.10	.55
6. IMITATIVE-ORIGINAL	.19	.17	-.65	-.24	-.29	.58
7. CREATIVE-UNIMAGINATIVE	.64	-.11	-.72	.02	-.19	.56
8. RESTRICTED-FREE	.02	.14	-.76	.09	.23	.65
9. DECISIVE-DOUBTFUL	.48	.15	.20	.06	-.63	.70
10. QUESTIONABLE-SUBSTANTIATED	.11	.70	-.10	-.05	-.15	.54
11. UNCONFIRMED-CONCLUSIVE	-.04	.27	-.10	-.01	-.83	.76
12. SUBJECTIVE-OBJECTIVE	-.11	.67	.07	.00	-.07	.47
13. DEEP-SHALLOW	.72	.06	-.11	.23	.19	.62
14. EXCEPTIONAL-COMMON	-.63	.03	.12	.11	-.16	.45
15. SIMPLE-COMPLEX	-.11	-.79	.12	.77	.01	.67
16. EASY-DIFFICULT	.01	-.17	-.07	.78	-.02	.62
17. VALUABLE-WORTHLESS	.72	.34	.08	.00	.01	.65
18. IRRELEVANT-SIGNIFICANT	.24	.57	-.76	-.19	-.14	.51
19. BENEFICIAL-HARMFUL	.69	.33	.07	-.00	-.10	.59
20. HINDERING-HELPFUL	.00	.62	-.21	-.23	.09	.44
SUM OF SQUARED LOADINGS	3.2	1.9	1.5	1.5	1.4	9.3
PERCENT OF SUM OF COMMUNALITIES	34.2	20.3	15.9	15.7	14.9	100.0

SCALE ANALYSIS OF RESPONSES BY UNDERGRADUATE EDUCATION STUDENTS

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE--

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.54	.48	-.04	.08	.23	.57
6. IMITATIVE-ORIGINAL	-.05	.68	.09	-.05	-.23	.52
7. CREATIVE-UNIMAGINATIVE	.57	.40	.16	.13	.19	.54
8. RESTRICTED-FREE	-.04	.47	-.55	-.01	-.25	.55
9. DECISIVE-DOUBTFUL	.39	.00	.72	-.04	.02	.56
10. QUESTIONABLE-SUBSTANTIATED	.20	.08	.03	-.71	-.19	.60
11. UNCONFIRMED-CONCLUSIVE	-.17	.31	.70	-.10	-.12	.54
12. SUBJECTIVE-OBJECTIVE	-.13	-.04	.07	-.73	-.01	.56
13. DEEP-SHALLOW	.52	.07	-.32	-.38	.22	.63
14. EXCEPTIONAL-COMMON	-.61	.08	.23	-.25	.15	.51
15. SIMPLE-COMPLEX	-.02	-.11	-.02	-.01	.56	.45
16. EASY-DIFFICULT	.05	.13	.01	.09	.53	.42
17. VALUABLE-WORTHLESS	.76	-.05	.03	-.28	-.03	.66
18. IRRELEVANT-SIGNIFICANT	.10	.37	.11	-.31	-.47	.47
19. BENEFICIAL-HARMFUL	.65	-.00	.14	-.15	-.14	.53
20. HINDERING-HELPFUL	.19	.16	-.04	-.01	.61	.44
SUM OF SQUARED LOADINGS	2.6	1.4	1.5	1.5	1.7	8.8
PERCENT OF SUM OF COMMUNALITIES	30.2	15.9	17.6	17.1	19.2	100.0

SCALE ANALYSIS OF RESPONSES BY STUDENTS

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE---

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.58	.37	.12	.11	.09	.50
6. IMITATIVE-ORIGINAL	.05	.60	.28	-.10	-.10	.46
7. CREATIVE-UNIMAGINATIVE	.53	.26	.20	.15	.01	.53
8. RESTRICTED-FREE	-.03	.72	-.32	-.05	-.04	.62
9. DECISIVE-DOUBTFUL	.49	-.21	.64	.02	-.05	.70
10. QUESTIONABLE-SUBSTANTIATED	.13	.17	.06	-.13	-.72	.59
11. UNCONFIRMED-CONCLUSIVE	-.06	.12	.83	-.08	-.07	.71
12. SUBJECTIVE-OBJECTIVE	-.08	-.02	.05	-.04	-.69	.50
13. DEEP-SHALLOW	-.66	.14	-.15	.24	-.28	.61
14. EXCEPTIONAL-COMMON	-.60	-.06	.29	.19	-.16	.51
15. SIMPLE-COMPLEX	-.01	-.08	-.04	.70	-.03	.50
16. EASY-DIFFICULT	.09	.17	.02	.62	.18	.46
17. VALUABLE-WORTHLESS	.73	-.08	-.10	.00	-.36	.69
18. IRRELEVANT-SIGNIFICANT	.12	.37	.23	-.45	-.28	.49
19. BENEFICIAL-HARMFUL	.70	-.03	.47	-.11	-.18	.54
20. HINDERING-HELPFUL	.27	.27	-.02	-.57	.08	.46
SUM OF SQUARED LOADINGS	2.9	1.5	1.5	1.6	1.5	9.0
PERCENT OF SUM OF COMMUNALITIES	32.6	16.2	16.8	17.7	16.7	100.0

SCALE ANALYSIS OF RESPONSES BY GRADUATE EDUCATION STUDENTS

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE---

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.56	.39	-.15	.10	.08	.50
6. IMITATIVE-ORIGINAL	.08	.52	-.31	-.02	-.14	.39
7. CREATIVE-UNIMAGINATIVE	.62	.26	-.22	.21	-.02	.54
8. RESTRICTED-FREE	-.08	.75	.26	.00	-.05	.64
9. DECISIVE-DOUBTFUL	.55	-.22	-.59	-.01	-.03	.71
10. QUESTIONABLE-SUBSTANTIATED	.14	.20	-.09	-.12	-.71	.58
11. UNCONFIRMED-CONCLUSIVE	-.05	.09	-.85	-.10	-.06	.75
12. SUBJECTIVE-OBJECTIVE	-.05	.01	-.03	-.03	-.77	.60
13. DEEP-SHALLOW	-.67	.18	.08	.29	-.21	.62
14. EXCEPTIONAL-COMMON	-.58	-.11	-.29	.23	-.12	.47
15. SIMPLE-COMPLEX	-.02	-.01	.08	.72	-.03	.52
16. EASY-DIFFICULT	.11	.23	-.02	.58	.27	.47
17. VALUABLE-WORTHLESS	.74	-.08	.15	.02	-.39	.72
18. IRRELEVANT-SIGNIFICANT	.13	.43	-.23	-.44	-.29	.53
19. BENEFICIAL-HARMFUL	.72	.01	-.07	-.08	-.16	.55
20. HINDERING-HELPFUL	.32	.32	.09	-.57	.00	.53
SUM OF SQUARED LOADINGS	3.0	1.5	1.5	1.6	1.5	9.1
PERCENT OF SUM OF COMMUNALITIES	32.8	16.8	16.4	17.4	16.7	100.0

SCALE ANALYSIS OF RESPONSES BY UNDERGRADUATE PSYCHOLOGY STUDENTS

ROTATED FACTORS (ROTATED TO THE VARIMAX CRITERION OF ORTHOGONAL SIMPLE STRUCTURE--

VARIABLE	1	2	3	4	5	H2
5. EXCITING-BORING	.61	.01	.15	.11	.27	.48
6. IMITATIVE-ORIGINAL	.08	.14	.27	-.16	.64	.53
7. CREATIVE-UNIMAGINATIVE	.67	-.13	.19	-.08	.18	.54
8. RESTRICTED-FREE	.08	.11	-.25	-.01	.75	.64
9. DECISIVE-DOUBTFUL	.47	-.06	.67	-.05	-.23	.73
10. QUESTIONABLE-SUBSTANTIATED	.08	.07	.06	-.72	.28	.60
11. UNCONFIRMED-CONCLUSIVE	-.04	.06	.89	-.04	.10	.74
12. SUBJECTIVE-OBJECTIVE	-.03	.11	.05	-.75	-.08	.59
13. DEEP-SHALLOW	-.67	-.17	-.16	-.28	.04	.58
14. EXCEPTIONAL-COMMON	-.65	-.17	.27	-.16	-.11	.56
15. SIMPLE-COMPLEX	-.01	-.68	.01	-.00	-.13	.48
16. EASY-DIFFICULT	.08	-.64	.05	.22	.18	.50
17. VALUABLE-WORTHLESS	.71	-.04	-.09	-.39	-.03	.67
18. IRRELEVANT-SIGNIFICANT	.13	.51	.23	-.20	.28	.47
19. BENEFICIAL-HARMFUL	.79	.13	.05	-.19	-.05	.55
20. HINDERING-HELPFUL	.26	.55	-.02	.11	.26	.45
SUM OF SQUARED LOADINGS	3.0	1.6	1.6	1.5	1.4	9.1
PERCENT OF SUM OF COMMUNALITIES	33.1	17.4	17.2	16.6	15.7	100.0

Appendix B - 2

Tables of Principle Component Factors Rotated

According to the Normalized Varimax Criterion;

Within Concepts Analyses

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
ED. RESEARCH
WITH VARIMAX AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  15 VARIABLES,  1044 CASES.   MATRIX WAS COMPUTED ON 01/25/74 USING MMATRIX
ED. RESEARCH EXCITING-BORING                                    VARIABLE   1
ED. RESEARCH IMMITATIVE-ORIGIN                                  VARIABLE   2
ED. RESEARCH CREATIVE-UNIMAGIN                                  VARIABLE   3
ED. RESEARCH RESTRICTED-FREE                                    VARIABLE   4
ED. RESEARCH DECISIVE-DOUBTFUL                                  VARIABLE   5
ED. RESEARCH QUESTION-SUBSTANT                                  VARIABLE   6
ED. RESEARCH UNCONFIRM-CONCLUS                                  VARIABLE   7
ED. RESEARCH SUBJECT-OBJECTIVE                                  VARIABLE   8
ED. RESEARCH DEEP-SHALLOW                                       VARIABLE   9
ED. RESEARCH EXCEPTION-COMMON                                   VARIABLE  10
ED. RESEARCH SIMPLE-COMPLEX                                     VARIABLE  11
ED. RESEARCH EASY-DIFFICULT                                     VARIABLE  12
ED. RESEARCH VALUABLE-WORTHLES                                  VARIABLE  13
ED. RESEARCH TOPIC-SIGNIFICANT                                  VARIABLE  14
ED. RESEARCH BENEFIC-HARMFUL                                    VARIABLE  15
ED. RESEARCH HINDERING-HELPFUL                                  VARIABLE  16
MEANS (8F10.4)
    3.7529    3.7232    3.9697    3.7165    3.0033    2.9531    3.1149    3.2318
    3.7155    3.7883    5.5479    5.5125    2.5833    2.4511    2.9029    3.1257
STANDARD DEVIATIONS (8F10.4)
    1.4944    1.5906    1.2688    1.4947    1.2764    1.5076    1.4385    1.5351
    1.5746    1.4507    1.2549    1.2491    1.2495    1.3707    1.2571    1.3748
CORRELATIONS (8F10.7)
```

VAR.MAX ROTATION 16 TESTS, 4 FACTORS

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

	1	2	3	4
1	.170	.857	-.527	.022
2	.259	.520	.082	-.077
3	.186	.899	-.596	-.089
4	.340	.896	-.041	-.040
5	.156	.865	-.682	-.039
6	.566	.883	-.252	-.089
7	.611	-.113	-.197	-.048
8	.798	-.070	-.047	-.133
9	.255	-.709	.249	.022
10	.858	-.751	.270	.043
11	-.212	-.188	.185	.498
12	-.118	-.014	.024	.749
13	.125	.132	-.733	-.043
14	.755	.274	-.210	-.135
15	.134	.876	-.736	-.065
16	.084	.696	-.115	-.025

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

1.411	1.496	2.394	.878

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.088	.093	.150	.055

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.229	.242	.388	.141

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
EXPERIMENT
WITH ORTHOG AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  16 VARIABLES,  1044 CASES.    MATRIX WAS COMPUTED ON 01/26/74 USING WMATRIX
EXPERIMENT    EXCITING-BORING                                    VARIABLE   1
EXPERIMENT    IMMITATIVE-ORIGIN                                  VARIABLE   2
EXPERIMENT    CREATIVE-UNIMAGIN                                  VARIABLE   3
EXPERIMENT    RESTRICTED-FREE                                    VARIABLE   4
EXPERIMENT    DECISIVE-DOUBTFUL                                  VARIABLE   5
EXPERIMENT    QUESTION-SUBSTANT                                  VARIABLE   6
EXPERIMENT    UNCONFIRM-CONCLUS                                  VARIABLE   7
EXPERIMENT    SUBJECT-OBJECTIVE                                  VARIABLE   8
EXPERIMENT    DEEP-SHALLOW                                       VARIABLE   9
EXPERIMENT    EXCEPTION-COMMON                                   VARIABLE  10
EXPERIMENT    SIMPLE-COMPLEX                                     VARIABLE  11
EXPERIMENT    EASY-DIFFICULT                                     VARIABLE  12
EXPERIMENT    VALUABLE-WORTHLES                                  VARIABLE  13
EXPERIMENT    IRREL-SIGNIFICANT                                  VARIABLE  14
EXPERIMENT    BENEFIC-HARMFUL                                    VARIABLE  15
EXPERIMENT    HINDERING-HELPFUL                                  VARIABLE  16
MEANS (8F10.4)
    3.3027    3.9291    4.4109    3.7548    3.6102    4.1598    2.7462    3.9483
    4.5785    4.1379    5.5134    5.2117    3.9871    2.3611    2.8239    2.2864
STANDARD DEVIATIONS (8F10.4)
    1.3484    1.4775    1.8709    1.7887    1.1978    1.5111    1.3496    1.5355
    1.0439    1.8862    1.2233    1.3744    1.9691    1.2747    1.1024    1.2783
CORRELATIONS (9F10.7)
```

PATTERN MATRIX, OBS FOR TESTS FROM FACTORS

	1	2	3	4
1	-.056	-.064	-.647	-.035
2	-.302	.250	.162	-.077
3	-.533	-.065	-.735	-.226
4	.263	.437	-.063	-.260
5	.001	-.159	-.641	.222
6	-.744	.123	.119	.049
7	.348	.109	-.286	.307
8	-.565	.616	.257	.050
9	.514	-.078	.347	-.040
10	.607	-.045	.475	-.046
11	-.100	-.251	.043	-.377
12	.035	.090	-.025	-.497
13	-.733	-.142	-.184	-.079
14	-.073	.619	-.006	.086
15	.674	.075	-.722	-.073
16	-.075	.687	.040	-.028

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
MEASUREMENT
WITH ORTHOG AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  15 VARIABLES,  1044 CASES.   MATRIX WAS COMPUTED ON 01/26/76 USING (MATRIX
MEASUREMENT   EXCITING-BORING                                  VARIABLE   1
MEASUREMENT   IMMITATIVE-ORIGIN                                VARIABLE   2
MEASUREMENT   CREATIVE-UNIMAGIN                                VARIABLE   3
MEASUREMENT   RESTRICTED-FREE                                  VARIABLE   4
MEASUREMENT   DEFENSIVE-DOUBTFUL                               VARIABLE   5
MEASUREMENT   QUESTION-SUBSTANT                                VARIABLE   6
MEASUREMENT   UNCONFIRM-CONCLUS                                VARIABLE   7
MEASUREMENT   SUBJECT-OBJECTIVE                                VARIABLE   8
MEASUREMENT   DEEP-SHALLOW                                     VARIABLE   9
MEASUREMENT   EXCEPTION-COMMON                                 VARIABLE  10
MEASUREMENT   SIMPLE-COMPLEX                                   VARIABLE  11
MEASUREMENT   EASY-DIFFICULT                                   VARIABLE  12
MEASUREMENT   VALUABLE-WORTHLES                                VARIABLE  13
MEASUREMENT   TRIFL-SIGNIFICANT                                VARIABLE  14
MEASUREMENT   BENEFIC-HARMFUL                                  VARIABLE  15
MEASUREMENT   HINDERING-HELPFUL                                VARIABLE  16
MEANS (8F10.4)
    4.4952    3.8879    4.2795    4.5891    3.5623    2.9789    2.9971    3.7241
    2.4971    3.2988    5.2280    4.9659    4.2040    2.5775    3.3747    2.9511
STANDARD DEVIATIONS (8F10.4)
    1.4865    1.4641    1.4405    1.4879    1.3329    1.5111    1.4307    1.4607
    1.7879    1.7640    1.3927    1.4580    1.4027    1.3743    1.2969    1.4747
CORRELATIONS (8F10.7)
```

VARIMAX ROTATION 16 TESTS, 4 FACTORS

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

	1	2	3	4
1	.053	.299	-.493	.079
2	.306	-.211	-.558	-.193
3	.116	.094	-.542	.110
4	.172	-.263	-.473	.075
5	.410	.519	-.079	.186
6	.656	.008	-.076	.046
7	.380	-.066	-.049	.048
8	.214	.182	.227	-.117
9	.071	-.583	.030	.094
10	.063	-.259	.473	.079
11	-.272	.110	.109	.443
12	.065	-.166	-.144	.538
13	-.017	.802	.038	.002
14	.615	.111	-.094	-.106
15	.341	.561	-.273	.054
16	.582	.128	-.104	-.195

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

1.847 1.921 1.443 .675

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.115 .120 .090 .042

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.316 .329 .247 .119

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
SCIENCE
WITH ORTHOG AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  16 VARIABLES,  1044 CASES.   MATRIX WAS COMPUTED ON 01/26/74 USING WMATRIX
SCIENCE       EXCITING-BORING                                    VARIABLE   1
SCIENCE       IMMITATIVE-ORIGIN                                  VARIABLE   2
SCIENCE       CREATIVE-UNIMAGIN                                  VARIABLE   3
SCIENCE       RESTRICTED-FREE                                    VARIABLE   4
SCIENCE       DECISIVE-DOUBTFUL                                  VARIABLE   5
SCIENCE       QUESTION-SUSTAIN                                   VARIABLE   6
SCIENCE       UNCONFIRM-CONCLUS                                  VARIABLE   7
SCIENCE       SUBJECT-OBJECTIVE                                  VARIABLE   8
SCIENCE       DEEP-SHALLOW                                       VARIABLE   9
SCIENCE       EXCEPTION-COMMON                                   VARIABLE  10
SCIENCE       SIMPLE-COMPLEX                                     VARIABLE  11
SCIENCE       EASY-DIFFICULT                                     VARIABLE  12
SCIENCE       VALUABLE-WORTHLES                                  VARIABLE  13
SCIENCE       IRREL-SIGNIFICANT                                  VARIABLE  14
SCIENCE       BENEFIC-HARMFUL                                    VARIABLE  15
SCIENCE       HINDERING-HELPFUL                                  VARIABLE  16
MEANS (8F10.4)
    3.7328     3.8879     4.2318     3.2058     4.3774     2.5163     4.3467     2.7011
    4.8295     4.6226     5.6466     5.4741     2.6571     2.2261     2.5872     2.2471
STANDARD DEVIATIONS (8F10.4)
    1.7462     1.5016     1.9763     1.6379     1.9711     1.3627     1.5494     1.5178
    2.0950     1.1950     1.1438     1.4130     1.3494     1.2360     1.1112     1.2998
CORRELATIONS (8F10.7)
```

VARIMAX ROTATION 16 TESTS, 4 FACTORS

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

	1	2	3	4
1	-.437	-.063	.424	-.143
2	-.436	-.224	.059	.075
3	-.669	.142	.432	-.061
4	.287	-.702	-.025	-.153
5	-.760	.136	.208	.070
6	.136	-.570	.125	.055
7	-.755	-.229	.058	.069
8	-.046	-.411	-.032	.053
9	.797	-.158	-.252	-.162
10	.057	.056	-.475	-.029
11	.110	.112	-.308	-.359
12	-.005	.359	.136	-.639
13	-.314	-.074	.624	-.085
14	-.121	-.419	.265	.243
15	-.178	-.056	.711	.067
16	-.152	-.604	.061	.258

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

2.880	1.447	1.857	.754

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.181	.090	.116	.048

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.415	.208	.267	.110

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
TECH. REPORT
WITH ORTHOG AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  16 VARIABLES,  1044 CASES.   MATRIX WAS COMPUTED ON 01/26/74 USING WMATRIX
TECH. REPORT EXCITING-BORING                                  VARIABLE   .1
TECH. REPORT IMMITATIVE-ORIGIN                                VARIABLE    2
TECH. REPORT CREATIVE-UNIMAGIN                                VARIABLE    3
TECH. REPORT RESTRICTED-FREE                                  VARIABLE    4
TECH. REPORT DECISIVE-DOUBTFUL                                VARIABLE    5
TECH. REPORT QUESTION-SUBSTANT                                VARIABLE    6
TECH REPORT  UNCONFIRM-CONCLUS                                VARIABLE    7
TECH REPORT  SUBJECT-OBJECTIVE                                VARIABLE    8
TECH REPORT  DEEP-SHALLOW                                     VARIABLE    9
TECH REPORT  EXCEPTION-COMMON                                 VARIABLE   10
TECH REPORT  SIMPLE-COMPLEX                                   VARIABLE   11
TECH REPORT  EASY-DIFFICULT                                   VARIABLE   12
TECH REPORT  VALUABLE-WORTHLES                                VARIABLE   13
TECH REPORT  IRREL-SIGNIFICANT                                VARIABLE   14
TECH REPORT  BENEFIC-HARMFUL                                  VARIABLE   15
TECH REPORT  HINDERING-HELPFUL                                VARIABLE   16
MEANS (8F10.4)
    4.3372    3.3132    4.5326    4.5163    3.6398    3.3056    2.7998    2.6379
    3.4195    3.0766    5.1782    5.8640    3.6149    2.5603    3.0757    3.4780
STANDARD DEVIATIONS (8F10.4)
    1.0909    1.6351    1.3246    1.4994    1.2761    1.4336    1.3061    1.4527
    1.8230    1.5631    1.2778    1.3374    1.3565    1.3243    1.1956    1.0764
CORRELATIONS (8F10.7)
```

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

	1	2	3	4
1	-.006	-.068	-.630*	.122
2	-.236	.144	-.529*	-.129
3	-.036	-.433*	-.307	.155
4	-.139	.049	-.378*	.112
5	-.346	-.503*	.176	.063
6	-.470*	-.225	-.172	-.028
7	-.609*	-.022	-.141	.068
8	-.410*	.039	-.080	-.035
9	-.251	.681*	-.203	.267
10	-.354	.529*	-.118	.065
11	.178	.044	-.137	.562*
12	.481*	.071	-.053	.093
13	-.178	-.653*	-.053	.024
14	-.500*	-.091	-.300	-.233
15	-.261	-.540*	.026	.054
16	-.036	-.707*	-.073	-.338

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

1.747	2.497	1.177	.652

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.109	.156	.074	.041

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.238	.411	.194	.107

```
FACTOR ANALYSIS OF SCALES FOR CONCEPT
THEORY
WITH ORTHOG AND OBLIQUE ROTATIONS
WITHIN GROUPS CORR MATRIX--FROM STRUNG FILE--RESEARCH CONCEPTS ONLY
  15 VARIABLES,  1044 CASES.   MATRIX WAS COMPUTED ON 01/26/74 USING WMATRIX
THEORY        EXCITING-BORING                                  VARIABLE   1
THEORY        IMMITATIVE-ORIGIN                                VARIABLE   2
THEORY        CREATIVE-UNIMAGIN                                VARIABLE   3
THEORY        RESTRICTED-FREE                                  VARIABLE   4
THEORY        DECISIVE-DOUBTFUL                                VARIABLE   5
THEORY        QUESTION-SUBSTANT                                VARIABLE   6
THEORY        UNCONFIRM-CONCLUS                                VARIABLE   7
THEORY        SUBJECT-OBJECTIVE                                VARIABLE   8
THEORY        DEEP-SHALLOW                                     VARIABLE   9
THEORY        EXCEPTION-COMMON                                 VARIABLE  10
THEORY        SIMPLE-COMPLEX                                   VARIABLE  11
THEORY        EASY-DIFFICULT                                   VARIABLE  12
THEORY        VALUABLE-WORTHLES                                VARIABLE  13
THEORY        IRRFL-SIGNIFICANT                                VARIABLE  14
THEORY        BENEFIC-HARMFUL                                  VARIABLE  15
THEORY        HINDERING-HELPFUL                                VARIABLE  16
MEANS (8F10.4)
    3.6178    2.8151    3.1897    3.4787    4.0249    3.4804    3.4943    3.7098
    4.7414    4.2165    5.5738    5.4454    3.0891    2.4511    3.0824    3.4598
STANDARD DEVIATIONS (8F10.4)
    1.4379    1.4718    1.4265    1.6353    1.3373    1.5044    1.4911    1.6616
    1.2477    1.3016    1.2651    1.4121    1.2573    1.2341    1.0969    1.2243
CORRELATIONS (8F10.7)
```

PATTERN MATRIX, COEF FOR TESTS FROM FACTORS

	1	2	3	4
1	.629.	-.190	.090	.226
2	.017	-.631.	-.028	-.011
3	.600.	-.150	.218	.060
4	-.079	-.541.	.068	.157
5	.414	.370	-.528.	.067
6	-.027	-.117	-.666.	.022
7	-.107	-.041	-.776.	.051
8	-.133	-.085	-.280.	-.056
9	-.628.	-.177	.014	.258
10	-.588.	-.045	.024	.018
11	.012	.175	-.037	.530.
12	.024	-.064	-.076	.626.
13	.729.	-.042	-.048	-.035
14	.104	-.563.	-.161	-.068
15	.776.	.069	-.045	.042
16	.086	-.366.	-.082	-.190

(1) (2) (3) (4)

Appendix B - 3

Rotated Factor Matricies for Concept x Scale Analyses

1. Analysis of concepts x scales 1, 3, 4, 10, 13, 15
2. Analysis of concepts x scales 11, 12
3. Analysis of concepts x scales 4, 9, 11, 12
4. Analysis of concepts x scales 2, 5, 6, 7, 8, 14, 16

1. Analysis of Concepts x Scales
1, 3, 4, 10, 13, 15

ED. RESEARCH	EXCITING-BORING	VARIABLE	1
ED. RESEARCH	CREATIVE-UNIMAGTN	VARIABLE	2
ED. RESEARCH	DEEP-SHALLOW	VARIABLE	3
ED. RESEARCH	EXCEPTION-COMMON	VARIABLE	4
ED. RESEARCH	VALUABLE-WORTHLES	VARIABLE	5
ED. RESEARCH	BENEFIC-HARMFUL	VARIABLE	6
EXPERIMENT	EXCITING-BORING	VARIABLE	7
EXPERIMENT	CREATIVE-UNIMAGTN	VARIABLE	8
EXPERIMENT	DEEP-SHALLOW	VARIABLE	9
EXPERIMENT	EXCEPTION-COMMON	VARIABLE	10
EXPERIMENT	VALUABLE-WORTHLES	VARIABLE	11
EXPERIMENT	BENEFIC-HARMFUL	VARIABLE	12
MEASUREMENT	EXCITING-BORING	VARIABLE	13
MEASUREMENT	CREATIVE-UNIMAGTN	VARIABLE	14
MEASUREMENT	DEEP-SHALLOW	VARIABLE	15
MEASUREMENT	EXCEPTION-COMMON	VARIABLE	16
MEASUREMENT	VALUABLE-WORTHLES	VARIABLE	17
MEASUREMENT	BENEFIC-HARMFUL	VARIABLE	18
SCIENCE	EXCITING-BORING	VARIABLE	19
SCIENCE	CREATIVE-UNIMAGTN	VARIABLE	20
SCIENCE	DEEP-SHALLOW	VARIABLE	21
SCIENCE	EXCEPTION-COMMON	VARIABLE	22
SCIENCE	VALUABLE-WORTHLES	VARIABLE	23
SCIENCE	BENEFIC-HARMFUL	VARIABLE	24
TECH. REPORT	EXCITING-BORING	VARIABLE	25
TECH. REPORT	CREATIVE-UNIMAGTN	VARIABLE	26
TECH REPORT	DEEP-SHALLOW	VARIABLE	27
TECH REPORT	EXCEPTION-COMMON	VARIABLE	28
TECH REPORT	VALUABLE-WORTHLES	VARIABLE	29
TECH REPORT	BENEFIC-HARMFUL	VARIABLE	30
THEORY	EXCITING-BORING	VARIABLE	31
THEORY	CREATIVE-UNIMAGTN	VARIABLE	32
THEORY	DEEP-SHALLOW	VARIABLE	33
THEORY	EXCEPTION-COMMON	VARIABLE	34
THEORY	VALUABLE-WORTHLES	VARIABLE	35
THEORY	BENEFIC-HARMFUL	VARIABLE	36

PRINCIPAL COMPONENTS STRUCTURE MATRIX

	1	2	3	4	5	6	7
1	.407	-.[illegible]23	-.208	-.324	.107	.443	.008
2	.525	-.299	-.145	-.117	-.024	.330	.082
3	-.516	-.382	.204	.041	-.055	.108	-.281
4	-.386	-.089	.717	-.127	.283	-.044	-.488
5	.554	-.196	.012	-.422	-.053	.317	.183
6	.609	-.299	.126	-.395	-.064	.150	.169
7	.645	-.197	.073	-.126	-.058	-.041	-.129
8	.705	.359	-.101	-.002	.060	.033	-.191
9	-.651	-.294	.027	.059	.161	-.071	-.071
10	-.470	.138	.046	-.221	.401	-.184	.064
11	.637	.464	.020	-.051	.071	.019	.016
12	.656	-.197	.267	-.187	-.160	-.110	.034
13	.351	-.316	-.427	-.043	.189	-.027	-.171
14	.188	-.412	-.378	-.040	.029	-.153	-.389
15	-.566	-.402	.201	.012	-.073	.064	-.044
16	-.764	.160	.469	-.274	.237	.089	.016
17	.661	.331	-.108	-.112	.192	-.179	-.038
18	.602	-.229	-.021	-.185	.001	-.366	.009
19	.568	.046	.236	.194	-.003	.275	-.354
20	.701	.309	-.004	.056	.036	.081	-.278
21	-.657	-.500	-.041	.018	-.087	-.058	.098
22	-.407	.143	-.071	-.266	.558	.133	.074
23	.620	.055	.242	-.086	-.064	.035	-.274
24	.625	-.137	.333	-.153	-.216	-.050	-.076
25	-.050	-.462	-.521	.026	.183	-.070	.173
26	.342	-.317	-.418	.096	.019	-.122	-.169
27	-.671	-.404	.108	-.025	-.135	.060	-.071
28	-.545	-.405	.300	-.197	-.028	-.049	-.145
29	.600	-.193	-.046	-.213	.005	-.285	-.027
30	.522	-.160	.063	-.183	.021	-.249	-.004
31	.441	-.357	.142	.488	.373	.180	.059
32	.478	-.202	.235	.304	.280	.138	.015
33	-.566	.169	-.197	-.114	-.018	.197	-.241
34	-.467	.200	-.080	-.540	.058	-.137	-.111
35	.620	-.338	.281	.121	.209	-.170	.124
36	.621	-.250	.290	.212	.211	-.124	.133

Factors 2 - 6, Obliquely Rotated

PATTERN MATRIX, COLT FOR TESTS FROM FACTORS

	1	2	3	4	5
1	.060	-.122	.047	.095	.679
2	.032	-.105	.070	-.079	.435
3	-.267	.662	.190	-.139	.136
4	-.273	.162	.162	.316	-.009
5	-.137	.101	-.145	.043	.522
6	-.742	.091	-.139	.035	.365
7	-.277	-.036	-.069	-.033	.053
8	.200	.063	-.080	.105	-.034
9	-.181	-.177	.188	.087	-.035
10	-.092	-.061	.008	.565	-.109
11	.256	.204	-.108	.160	-.061
12	-.619	.154	-.134	-.075	-.003
13	.039	-.541	.030	.127	.110
14	-.128	-.549	-.068	-.016	.011
15	-.715	.643	.157	-.139	.115
16	-.213	.464	.064	.359	.112
17	.150	-.040	-.143	.292	-.135
18	-.401	-.232	-.213	.094	-.199
19	.241	.174	.237	-.114	.149
20	.255	.141	.006	.048	-.016
21	-.703	-.244	.064	-.161	.051
22	.137	-.056	.113	.612	.712
23	-.093	.255	.027	-.043	-.005
24	-.392	.271	-.115	-.137	.015
25	.012	-.702	.070	.072	.082
26	.020	-.575	-.000	-.071	-.039
27	-.285	-.027	.067	-.185	.141
28	-.519	.002	.021	.008	.094
29	-.333	-.206	-.218	.102	-.117
30	-.341	-.094	-.151	.108	-.118
31	.225	-.090	.608	.099	.031
32	-.014	.069	.540	.089	-.002
33	.259	-.011	-.112	.018	.221
34	-.142	.007	-.472	.722	.087
35	-.373	-.029	.305	.124	-.176
36	-.261	.023	.366	.097	-.194

2. Analysis of Concepts x Scales

11 & 12

VARIMAX ROTATION 12 TESTS, 2 FACTORS

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

		1	2
ED. RESEARCH	SIMPLE-COMPLEX	-.714	-.058
ED. RESEARCH	EASY-DIFFICULT	-.612	-.198
EXPERIMENT	SIMPLE-COMPLEX	-.617	-.105
EXPERIMENT	EASY-DIFFICULT	-.268	-.589
MEASUREMENT	SIMPLE-COMPLEX	-.366	-.448
MEASUREMENT	EASY-DIFFICULT	.088	-.646
SCIENCE	SIMPLE-COMPLEX	-.428	-.337
SCIENCE	EASY-DIFFICULT	-.180	-.564
TECH REPORT	SIMPLE-COMPLEX	-.176	-.533
TECH REPORT	EASY-DIFFICULT	-.132	-.539
THEORY	SIMPLE-COMPLEX	-.618	-.438
THEORY	EASY-DIFFICULT	-.566	-.166

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

2.422 2.045

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.202 .170

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.542 .458

VARIMAX ROTATION 24 TESTS, 4 FACTORS

MATRIX ROW NORMALIZED BEFORE ROTATION

ROTATED STRUCTURE AND PATTERN MATRIX

		1	2	3	4
ED. RESEARCH	RESTRICTED-FREE	-.009	-.032	-.802	-.028
ED. RESEARCH	DEEP-SHALLOW	.686	-.071	-.065	.200
ED. RESEARCH	SIMPLE-COMPLEX	.017	.553	.111	.170
ED. RESEARCH	EASY-DIFFICULT	-.041	.508	.028	.297
EXPERIMENT	RESTRICTED-FREE	.009	.017	-.778	-.015
EXPERIMENT	DEEP-SHALLOW	.759	.164	-.040	-.034
EXPERIMENT	SIMPLE-COMPLEX	-.002	.615	.095	-.043
EXPERIMENT	EASY-DIFFICULT	-.084	.497	-.067	.201
MEASUREMENT	RESTRICTED-FREE	.123	.021	-.592	.106
MEASUREMENT	DEEP-SHALLOW	.[illegible]1	-.171	-.[illegible]98	.096
MEASUREMENT	SIMPLE-COMPLEX	-.138	.442	.[illegible]96	.367
MEASUREMENT	EASY-DIFFICULT	.086	.176	-.139	.569
SCIENCE	RESTRICTED-FREE	.247	-.036	-.607	-.070
SCIENCE	DEEP-SHALLOW	.781	-.033	-.251	.016
SCIENCE	SIMPLE-COMPLEX	.217	.621	-.081	-.039
SCIENCE	EASY-DIFFICULT	-.005	.334	.013	.455
TECH. REPORT	RESTRICTED-FREE	.090	-.025	-.594	.221
TECH REPORT	DEEP-SHALLOW	.792	-.025	-.152	.043
TECH REPORT	SIMPLE-COMPLEX	.192	.220	-.011	.624
TECH REPORT	EASY-DIFFICULT	-.074	.493	-.003	.030
THEORY	RESTRICTED-FREE	.170	-.048	-.560	-.086
THEORY	DEEP-SHALLOW	.502	.374	-.161	-.332
THEORY	SIMPLE-COMPLEX	-.005	.602	.075	.315
THEORY	EASY-DIFFICULT	-.023	.540	-.037	.113

AMOUNT OF VARIANCE ATTRIBUTABLE TO EACH FACTOR

3.308	3.066	2.937	1.564

PROPORTION OF TOTAL VARIANCE ATTRIBUTABLE TO EACH FACTOR

.138	.128	.122	.065

PROPORTION OF EXPLAINED VARIANCE ATTRIBUTABLE TO EACH FACTOR

.364	.292	.270	.144

4. Analysis of Concepts x Scales
2, 5, 6, 7, 8, 14, 16

ED. RESEARCH	IMMITATIVE-ORIGIN	VARIABLE	1
ED. RESEARCH	DECISIVE-DOUBTFUL	VARIABLE	2
ED. RESEARCH	QUESTION-SUBSTANT	VARIABLE	3
ED. RESEARCH	UNCONFIRM-CONCLUS	VARIABLE	4
ED. RESEARCH	SUBJECT-OBJECTIVE	VARIABLE	5
ED. RESEARCH	IRREL-SIGNIFICANT	VARIABLE	6
ED. RESEARCH	HINDERING-HELPFUL	VARIABLE	7
EXPERIMENT	IMMITATIVE-ORIGIN	VARIABLE	8
EXPERIMENT	DECISIVE-DOUBTFUL	VARIABLE	9
EXPERIMENT	QUESTION-SUBSTANT	VARIABLE	10
EXPERIMENT	UNCONFIRM-CONCLUS	VARIABLE	11
EXPERIMENT	SUBJECT-OBJECTIVE	VARIABLE	12
EXPERIMENT	IRREL-SIGNIFICANT	VARIABLE	13
EXPERIMENT	HINDERING-HELPFUL	VARIABLE	14
MEASUREMENT	IMMITATIVE-ORIGIN	VARIABLE	15
MEASUREMENT	DECISIVE-DOUBTFUL	VARIABLE	16
MEASUREMENT	QUESTION-SUBSTANT	VARIABLE	17
MEASUREMENT	UNCONFIRM-CONCLUS	VARIABLE	18
MEASUREMENT	SUBJECT-OBJECTIVE	VARIABLE	19
MEASUREMENT	IRREL-SIGNIFICANT	VARIABLE	20
MEASUREMENT	HINDERING-HELPFUL	VARIABLE	21
SCIENCE	IMMITATIVE-ORIGIN	VARIABLE	22
SCIENCE	DECISIVE-DOUBTFUL	VARIABLE	23
SCIENCE	QUESTION-SUBSTANT	VARIABLE	24
SCIENCE	UNCONFIRM-CONCLUS	VARIABLE	25
SCIENCE	SUBJECT-OBJECTIVE	VARIABLE	26
SCIENCE	IRREL-SIGNIFICANT	VARIABLE	27
SCIENCE	HINDERING-HELPFUL	VARIABLE	28
TECH. REPORT	IMMITATIVE-ORIGIN	VARIABLE	29
TECH. REPORT	DECISIVE-DOUBTFUL	VARIABLE	30
TECH. REPORT	QUESTION-SUBSTANT	VARIABLE	31
TECH REPORT	UNCONFIRM-CONCLUS	VARIABLE	32
TECH REPORT	SUBJECT-OBJECTIVE	VARIABLE	33
TECH REPORT	IRREL-SIGNIFICANT	VARIABLE	34
TECH REPORT	HINDERING-HELPFUL	VARIABLE	35
THEORY	IMMITATIVE-ORIGIN	VARIABLE	36
THEORY	DECISIVE-DOUBTFUL	VARIABLE	37
THEORY	QUESTION-SUBSTANT	VARIABLE	38
THEORY	UNCONFIRM-CONCLUS	VARIABLE	39
THEORY	SUBJECT-OBJECTIVE	VARIABLE	40
THEORY	IRREL-SIGNIFICANT	VARIABLE	41
THEORY	HINDERING-HELPFUL	VARIABLE	42

PATTERN MATRIX, COEF FOR TESTS FROM FACTORS

	1	2	3	4	5	6
1	.117	-.492	.756	-.170	-.140	-.375
2	.227	-.099	-.589	-.100	.102	-.361
3	.004	.066	-.762	.026	.026	-.742
4	.168	.202	-.192	-.194	-.204	-.456
5	.216	.082	.225	.038	-.516	-.283
6	-.139	-.116	.049	.152	.181	-.734
7	-.259	-.564	.079	.078	.088	-.196
8	-.072	-.678	.141	-.051	.079	-.117
9	-.019	-.044	-.667	-.224	.056	.049
10	-.100	-.579	-.175	-.061	.097	-.035
11	-.134	.168	-.190	-.298	-.245	.072
12	.206	-.710	.101	.085	-.488	.078
13	-.581	.020	.014	.087	.052	-.742
14	-.658	-.078	.077	.071	.089	-.183
15	.165	.038	.057	-.393	-.198	-.210
16	-.056	.107	-.708	.146	-.134	-.008
17	-.045	.267	-.296	-.038	-.457	-.040
18	-.020	.090	-.095	.092	-.285	-.242
19	.022	-.298	-.306	.178	-.650	.287
20	-.420	.189	-.190	.155	-.342	.004
21	-.277	-.019	-.131	.047	-.409	.015
22	-.007	-.676	.076	-.001	-.117	-.020
23	.080	-.475	-.515	.050	.178	.141
24	-.282	-.048	.017	-.167	-.236	.015
25	-.026	-.080	-.275	-.042	.007	.076
26	-.074	-.249	.141	-.011	-.551	.149
27	-.700	-.820	-.071	.066	.160	-.021
28	-.677	-.177	.075	.077	.026	.056
29	-.017	-.032	.777	-.289	-.138	-.386
30	.028	.083	-.634	.078	-.075	.002
31	.101	-.055	-.155	-.047	-.343	-.249
32	-.031	.259	-.129	-.015	-.755	-.160
33	.102	.071	.249	.146	-.653	.042
34	-.454	.214	-.111	-.026	-.191	-.117
35	-.225	-.757	-.479	.052	-.031	-.026
36	-.293	-.002	.098	-.250	-.366	.191
37	.069	-.179	-.400	-.571	.256	.128
38	-.066	.078	.021	-.812	.060	.054
39	.051	-.014	.055	-.870	.036	-.017
40	.108	-.077	.147	-.330	-.279	.067
41	-.570	.157	-.004	-.722	-.076	.171
42	-.556	-.020	.131	-.192	.001	.077

STRUCTURE MATRIX, TEST-FACTOR CORRELATIONS

	1	2	3	4	5	6
1	-.165	-.710	.172	-.159	-.227	-.[illegible]
2	-.057	-.186	-.[illegible]	-.211	-.067	-.360
3	-.290	.069	-.171	-.254	-.[illegible]	-.[illegible]
4	-.160	.255	-.[illegible]	-.462	-.[illegible]	-.587
5	-.117	.171	-.022	-.272	-.525	-.406
6	-.335	-.151	-.[illegible]	-.041	-.174	-.545
7	-.[illegible]	-.612	-.190	.071	-.060	-.225
8	-.191	-.604	-.[illegible]	.046	.040	-.[illegible]
9	-.186	-.185	-.[illegible]	-.[illegible]	-.108	-.136
10	-.241	-.[illegible]	-.[illegible]	.059	.[illegible]	-.059
11	-.[illegible]	.174	-.[illegible]	-.487	-.468	-.279
12	-.087	-.629	-.[illegible]	.158	-.249	.028
13	-.629	-.106	-.134	-.124	-.297	-.[illegible]
14	-.665	-.161	-.091	-.100	-.264	-.[illegible]
15	-.093	.197	-.[illegible]	-.502	-.[illegible]	-.360
16	-.226	-.119	-.687	-.064	-.216	-.[illegible]
17	-.[illegible]	.217	-.[illegible]	-.346	-.572	-.[illegible]
18	-.239	.069	-.144	-.144	-.[illegible]	-.[illegible]
19	-.186	-.298	-.[illegible]	.102	-.427	.080
20	-.549	.043	-.256	-.151	-.522	-.308
21	-.448	-.092	-.238	-.183	-.516	-.271
22	-.186	-.617	-.158	.095	-.[illegible]	-.044
23	.025	-.[illegible]	-.567	.208	.258	.193
24	-.435	-.046	-.119	-.[illegible]	-.422	-.262
25	-.199	-.754	-.458	.047	.022	.027
26	-.[illegible]	-.[illegible]	.[illegible]	-.105	-.[illegible]	-.093
27	-.[illegible]	-.204	-.[illegible]	-.360	-.147	-.[illegible]
28	-.632	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.172
29	-.216	.154	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
30	-.115	-.[illegible]	-.602	-.[illegible]	-.127	-.110
31	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
32	-.[illegible]	.251	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
33	-.141	.126	.[illegible]	-.111	-.[illegible]	-.158
34	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
35	-.[illegible]	-.525	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
36	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.502	-.[illegible]
37	-.[illegible]	-.[illegible]	.[illegible]	-.[illegible]	.[illegible]	-.[illegible]
38	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
39	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
40	-.055	.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
41	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
42	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]